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TRANSACTIONS

OF THE

Odontological Society of Great Britain.

VOL. XXIII.—NEW SERIES.

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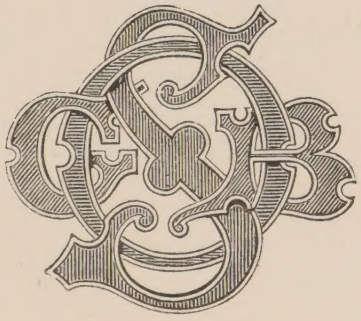
OF THE

ODONTOLOGICAL SOCIETY

OF

GREAT BRITAIN.



VOLUME XXIII.—NEW SERIES.

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Odontological Society of Great Britain.

ORDINARY MONTHLY MEETING

November 3rd, 1890.

MR. FELIX WEISS, L.D.S.,

PRESIDENT, IN THE CHAIR.

THE Minutes of the preceding meeting having been read and confirmed,

Messrs. J. F. COLYER, M.R.C.S., L.R.C.P., L.D.S.Eng., and G. W. BATEMAN, L.D.S., signed the Obligation Book and were admitted Members of the Society.

Mr. J. H. BADCOCK, 140, Harley Street, W., was nominated for membership.

The LIBRARIAN (Mr. ASHLEY GIBBINGS) reported the receipt of the new edition of Mr. Henry Sewill's "Dental Surgery," as also the reports of various scientific Societies, including the Smithsonian Report for 1886-7, the Proceedings of the Royal Dublin Society, the Proceedings of the Royal Society, *Quarterly Journal of Microscopical Science*, and the Calendar of the Royal College of Surgeons; also, a drawing of the trigeminal nerve and chart from Mr. Michael Lister.

The CURATOR (Mr. STORER BENNETT) stated that a student of the Dental Hospital (Mr. A. H. Farebrother) had presented the skull of an African bushman, the especial

point of interest being the socket for a third upper incisor on the right side. Mr. Ackery had presented a series of models showing absence of one or more lower incisors. Mr. R. H. Woodhouse had presented a necklace composed of thirty-four human teeth, which he had received from Mr. H. M. Stanley, accompanied by a description, of which the following is a copy:—

"*October* 19*th*, 1890.

"This necklace of native African teeth was worn by a native of Avisibba, on the Ituri River, about 1,550 miles inland from the mouth of the Congo River. He was one of the party that had lain in ambush at the confluence of the Ruku and Ituri. On examining the dead a warrior was found with a necklace of human teeth around his neck. It was carried away as a small evidence of the propensities of the cannibals. Among non man-eating tribes such an ornament would be considered horrible. Others of the same tribe wear monkey and crocodile teeth. On one occasion I saw one wearing a number of human teeth equal to ten necklaces of this kind, or between 300 and 400 teeth strung thickly together."

A humorous sketch had also been received, the gift of Mr. William Merson, of Bournemouth, which depicted a tooth being extracted in the "good old times."

The President, referring to Mr. Farebrother's specimen, thought the frontal elevation of the skull rather higher than one would expect in a bushman; it seemed to him to suggest the possibility of European origin.

Mr. Robert H. Woodhouse in presenting the necklace referred to above, remarked that it had been brought from Central Africa by the Emin Pasha Relief Expedition. It had been taken from the neck of a native killed in the skirmish in which Lieutenant Stairs was wounded, and consisted of thirty-four teeth, two of them being temporary; one, a lower wisdom tooth, gave evidence of extensive caries. The teeth were obtained by the natives by burning the skull. The single-fanged ones were pulled out, and the others were broken out, apparently with con-

siderable violence. Mr. Woodhouse mentioned that he had been anxious to obtain some skulls from Africa from Mr. Stanley, and asked him particularly if he had any pigmies' skulls. Mr. Stanley replied that he had only brought home two, and these had been sent to the Natural History Department of the British Museum, South Kensington. Mr. Woodhouse stated that Mr. Stanley had told him that in one place there were on each side of the road, in the position of the kerbstone in our streets, continuous rows half a mile in length, of skulls, the owners of which had all died a violent death. He had been rather surprised to hear from Mr. Stanley how great an amount of caries existed in the teeth of the native Africans; the great explorer mentioned that he and his subordinates were called upon to extract some 400 or 500 teeth. The teeth in the necklace came from a region never hitherto reached by a white man. The caries of which he had spoken existed amongst the tribes of the extreme Western and extreme Eastern coasts, which had doubtless been in contact with some form of civilization for some hundreds of years.

The President remarked that they were very much obliged to Mr. Woodhouse for the necklace, more particularly as it was accompanied by a letter from a man of such large experience as Mr. Stanley. He added that he had been told that it was quite a common thing among savage tribes for the victors to extract all the teeth of the slain and wear them as a kind of trophy.

Mr. C. V. Cotterell showed and explained a small device which he had designed, and had been using for some time, the object of which was to keep the rubber dam from the nose. In filling anterior cavities he had found it of great advantage. In several cases he had noticed the gold had a tendency to peel or not to adhere, and it occurred to him that this was due to the breath of the patient. This nose-guard enabled the rubber dam to be placed on the nose without impeding respiration.

Mr. J. Ackery referred to a case of "absence of lower incisors," reported by himself some two or three months

previously, when he had stated that these cases were very rare. His object in alluding to the subject now was to modify the statement, which it seemed was not strictly true. The gentleman who first pointed out to him that such a condition is not very rare had been kind enough to show him several similar models, and some of them were on the table: (1) a case in which the two incisors were missing in both upper and lower jaw; (2) two cases in which the two lower incisors were missing; (3) one lower incisor missing from the temporary dentition.

He also had a model showing extensive erosion, or abrasion of incisor, canine and bicuspid teeth, which he thought would be interesting. The condition was not in any sense due to the attrition of the lower teeth, because the distance between the anterior upper and lower teeth was three-eighths of an inch when the jaws were closed. The patient was a male, aged thirty-five years. The mouth might be considered a distinctly clean mouth. The patient was not in the habit of using a hard brush. With this model Mr. Ackery passed round a model of the mouth of a brother of the patient, showing erosion in the most natural position, viz., the lower incisors; the dentine had suffered, if possible, more than the enamel. In connection with this he also passed round a pair of lower teeth which he had extracted from a man aged fifty-six, showing erosion on the lingual surface.

Mr. R. H. Woodhouse wished to ask Mr. Ackery if these teeth were at all sensitive; he had himself noticed three or four cases in which patients had come to him suffering obscure pain, and on examination he had found that there had been a nerve exposed from the attrition of the teeth. He did not gather from Mr. Ackery's remarks whether the patient had suffered any severe pain or not.

Mr. James Stocken stated that a short time ago he had a case under observation in which the labial surfaces of the incisor teeth were uniformly eroded, and in this case there was no sensitiveness, though the erosion had gone so far as to produce quite a knife-like edge. In one or two cases he had tested the saliva and had found it decidedly acid.

Mr. J. Ackery, in reply, said that in his case there was absolutely no sensitiveness of the teeth. The patient did not complain of any, and when questioned on the subject did not even seem to regard the condition of his teeth as in any way peculiar. It would be noticed that he had lost the *first* upper right molar, whereas the tooth he consulted Mr. Ackery about was the *second* upper right molar.

The President then called on Mr. Matheson to read his paper.

Some Practical Points involved in the Relation of the Upper to the Lower Teeth.

By Leonard Matheson, L.D.S.

Mr. President and Gentlemen,—The brief paper that I have the honour to read to-night must appear to you to be of a decidedly heterogeneous character, when I say that it touches upon subjects apparently so disconnected in interest as contour fillings, regulating frames, all-gold crowns, and the habitual extraction of the sixth-year molar; and I feel that a word of explanation is due as to my reason for dealing in one paper with such various topics. My intention, then, is not to offer any elaborate presentation of the mathematical or mechanical principles involved in the articulation of the teeth, but simply to bring before you one or two matters of every-day interest. I regret indeed that I am not prepared to lay before you anything new or original, but it has occurred to me that a quarter of an hour might be not altogether wasted in considering some principles and methods of practical interest as viewed from a common standpoint—that, namely, of the "bite"—a standpoint which is, I am bound to say,

judging from prevalent modes of practice, far too frequently overlooked. I certainly need not remind the members of this Society of the fact—evident to the very youngest of Macaulay's school boys—that one jaw or set of teeth is useless without its antagonist, and that the value of even individual teeth must largely depend on the mutually harmonious relations existing between it and its opponents; but that these facts are constantly being forgotten or ignored is, I fear to all of us, a matter of every-day experience.

I propose to group my remarks under the following heads :—

I. The articulation of the teeth in relation to the etiology and treatment of approximal decay.

II. Irregularities of articulation as productive of pathological conditions of the alveolo-dental periosteum.

III. The "bite" as affecting certain modes of treatment adopted in the correction of irregularities.

I. *The articulation of the teeth in relation to the etiology and treatment of approximal decay.*

As a factor in the production of approximal decay the "bite" holds an important place. It is due to the action of the "bite" that food becomes wedged into approximal spaces, and by its decomposition promotes decay. Sometimes the very beginning of decay is due to this cause,

and even in the larger number of cases where the actual inception of disease occurs before there is any interspace to admit of the lodgment of food, yet when once the coronal wall of the cavity breaks in, allowing food to enter in appreciable quantity, the rate of decay is generally much accelerated and its ravages made to extend rapidly over the whole approximal surface. In those instances where the lodgment of food is the primary cause of decay, the space which admits the food is due to one of three things,—either to simple want of contact in two neighbouring teeth, otherwise normal, or to a flat instead of a contour filling having been employed on one or both sides of the space, or to the injudicious use of contour instead of flat fillings.

What can be done in the way of operative interference to limit, if not entirely to prevent, the action of this predisposing cause to caries—this accumulation of food wedged up between the teeth by the "bite"? Much may be done, on the one hand, by contour fillings, and on the other hand by judiciously shaped spaces, the use of both methods being demanded by the varying conditions met with.

In dealing with "approximal cavities" one's aim must be, so far as possible, to achieve three things:—

(1.) To prevent the recurrence of decay.

(2.) To render the tooth under treatment useful in mastication.

(3.) To protect the gum from irritation.

One of the first questions one asks oneself when an approximal cavity of any size presents itself for treatment, is whether or not to "contour" the filling to be inserted, and the answer to the question often requires very nice discrimination as to the possibility of decay being prevented, mastication rendered more easy, and the gum protected better by contouring, or by permanent separation.

That "circumstances alter cases" is a very old proverb, but the truth it embodies is very frequently overlooked. Too often an operator gets into the way of following indiscriminately one method in all cases, either invariably "contouring," or invariably "separating," or worse still, he follows no method at all, simply filling his cavity flush from one wall to another without any regard to contour on the one hand or properly-shaped space on the other, and leaving, in consequence, as often as not, an irregular interval between the teeth, such as must inevitably produce rapid mischief.

Too often one meets with cases in which a diseased tooth has been treated--well enough, so far as the individual tooth is concerned, but without any regard to the relation it holds to its

adjoining neighbours, to its antagonists in the opposite jaw, or to the gums and mouth as a whole.

Contour filling is desirable, nay, its use is imperatively called for, when by its employment one is able to achieve the three objects already referred to, *i.e.*, prevention of future decay, proper mastication, and protection of the gums.

Under what circumstances then, it behoves us to ask, does contour filling accomplish these things better than any other method of treating approximal cavities? The answer is simple, and it is this—when by contouring, the filling can be brought into *close* contact with the adjoining tooth. For, apart from the question of appearance—which we are not discussing now—the whole value of a contour filling lies in its knuckling up to the neighbouring tooth so as entirely to prevent the lodgment of food between the two neighbours, this lodgment being the fruitful source of recurrence of decay, irritation of the gums, and inability properly to masticate.

Contour filling is clearly called for, therefore, when the cavity to be treated is in a tooth standing so close to its neighbour as that a reasonable amount of contouring will restore the normal relation of the two. In the majority of instances this can be done, but the minority consists of not a few cases in which the diseased tooth stands

so apart from its neighbour that a restoration of its normal contour does *not* restore the normal relation of the two teeth, that is to say, there is still a slight space left between them. Under these circumstances contour filling is bad practice, seeing that instead of preventing it favours the retention of food between the teeth. Under these conditions, where the approximal space cannot be satisfactorily obliterated by contour filling, recourse must be had to the use of flat fillings and judicious shaping of the surfaces forming the mesial and distal walls of the space. Broadly speaking, this shaping (I am not speaking of front teeth) consists in making the walls boldly divergent, and very smooth and straight. Occasionally, when one's patient can be trusted to make diligent and constant use of quill tooth-picks and floss silk, the space may be made parallel-sided, and so a more extensive grinding surface retained; but as a rule the wedge-shape must be rigorously adhered to. Sometimes, in order at the same time to render the space as non-retentive, and to sacrifice as little tooth-substance as possible, the original space may be deliberately increased by means of gutta-percha or wool and mastic before finally shaping and filling.

With regard to the value of such spaces, it cannot, I think, be denied that, properly made

and used only where contour work is inadmissible, they conduce to the comfort and safety of both teeth and gums. But it cannot be too strongly maintained that between full contour and wide space there is no middle course, a narrow, irregular space, especially if the walls are allowed in the least degree to converge at the masticating surface, being fatal both to comfort and health. It is by no means easy in every case to determine which to adopt—contour or space. Whilst striving to keep an open mind on the subject, free from undue bias in favour of one method or the other, I should for myself be inclined to say "when in doubt, play contour."

Not infrequently one is called upon to deal with teeth the relation of which to their neighbours and to "the bite" calls for their restoration in contour, but in which disease is so very extensive as to render the wisdom of contour filling very questionable. In these cases the use of all-gold collar crowns is invaluable, or in the case of bicuspids, all gold, faced with porcelain. The particular advantage of this form of crown under the conditions named lies in the fact that it can be contoured out in any direction or to any extent, so that it knuckles tightly against the adjoining teeth, and antagonises exactly with its opponents; whilst the collar gives a security and finish which can be obtained by no other

method, and produces, if properly adjusted, no irritation of the gum after the day of insertion. I may say that my own experience of crowning by this method has tended to show me that perfect adaptation of the collar can only be obtained by fitting it to the root in the mouth. I have no faith in the use of a model for fine fitting. And as to the modelling of the articulating surface, there is no question, to my mind, that the best way of producing a natural shape, and at the same time one that will articulate accurately with the opposing tooth or teeth, is by striking it up on a cast obtained from a wax model, built up and carved for each case, rather than by the use of the die-plates sold for the purpose, which make each crown a stereotyped inartistic copy of every other.

There are cases in which partial gold crowns, as they may be called, render excellent service in the preservation of badly-decayed teeth and the restoration of comfort in mastication. For example, the mesial half of a tooth may be sound and strong, whilst the distal portion, both approximal and coronal, may be the seat of extensive decay. The amount of sound tissue is such as to make one feel unwarranted in removing it for the sake of inserting a complete crown, whilst the carious cavity is so far-spreading as to make the security and durability of a large

filling quite a question of chances. In such a case the contour of the tooth may be fully restored by the nice adjustment of a carefully-modelled shell of fine gold, so made as closely to overlap the margins of the cavity. For a method of constructing these partial crowns which possess the essential qualities of rapidity and accuracy, I am indebted to my friend Mr. Gardiner.

II. *Irregularities of articulation, as productive of pathological conditions of the alveolo-dental periosteum.*

(1) Very familiar to all is the periosteal mischief set up by fillings insufficiently cut down to articulate accurately with antagonising teeth; and yet it would appear scarcely superfluous to emphasise the importance of due care in the modelling of masticating surfaces, judging by the negligence which is so often displayed in this respect. Where the upper and lower teeth deeply interlock it is sometimes quite surprising how great the indentation that is required on the surface of a filling to allow proper play for the tooth biting against it.

The inflammatory disturbance produced by a filling or an artificial crown left too high varies greatly in intensity. Occasionally periostitis fully pronounced is met with, the gum surrounding the tooth being red and full, the tooth raised

in its socket, freely moveable, and very tender to touch. But this is rare; the condition more frequently found being a state rather of irritation than inflammation, or if the latter, then of a sub-acute or chronic character. Tenderness in mastication is much complained of, and the contact of the tongue may be alleged to cause pain, whilst the gum remains normal, or almost normal in colour, and direct pressure exercised by finger or instrument elicit little or no suffering. A curious point about many of these cases is the complaint made of sensitiveness to thermal irritants, such as is generally characteristic of irritation of the pulp.

(2) There are similar cases, so far as symptoms go, in which the mischief is due, not to a badly-finished filling, but to a disarrangement in the articulation of one or more teeth produced by the forward pressure of an erupting wisdom tooth. A patient presents himself with considerable periosteal discomfort, if not pain, in a first or second molar, or even a bicuspid. The tooth pointed out may be perfectly free from caries, and give little or no response to the usual tests for periostitis, and one may be disposed to seek for the source of pain as existing in some other tooth, or one may be inclined to look upon the irritation complained of as being a local and temporary manifestation of some constitutional

condition. But if the tooth be tested by the use of articulating paper it will be seen that there is an undue amount of pressure exerted upon it by its antagonist, and it will be found on close examination that the teeth have been thrown out of gear, as it were, by the enormous pressure of a wisdom tooth behind them.

(3) In like manner the eruption of the second, and even the first permanent molars, in some few instances, produces similar results, the teeth complained of in the latter class of cases being the first molars themselves, which will be found to bite cusp to cusp, instead of cusp into depression.

(4) Yet again, just as the "bite" may be thrown out by newly erupting teeth, so it may be thrown out with similar results by the extraction of teeth. The extraction of one or more teeth leads sooner or later to more or less change in the articulation of the remaining teeth, and one may find periosteal irritation arising from this cause, although it is not common.

I need not dwell on the treatment to be adopted in all these cases. It is sufficiently simple, and consists in nothing more than the use of corundum wheels to ease undue pressure, indicated by means of articulating paper. Even in the worst cases it is rare indeed for this simple treatment not to be rapidly followed by

complete comfort. The difficulty lies not in the operative procedure necessary to a cure, but in successful diagnosis of the cause of pain. It is of some assistance, in obscure cases, to bear in mind that the pressure producing the irritation will be found almost invariably to be exercised on one small isolated spot.

III. *The "bite," as affecting certain modes of treatment adopted in the correction of irregularities.*

(1) Extraction, as a means *per se* for the treatment of irregularity.—This large subject I shall only deal with in a very limited way—to the extent, namely, of considering briefly the question of the removal of molars or bicuspids for the relief of general overcrowding of the arch as a whole. There are those who argue—on paper—that extraction for this purpose is, in all but the most exceptional cases, to be utterly deprecated, that it is little short of criminal, in fact, to extract any tooth which in itself is not beyond saving; but I have yet to meet anyone entitled to respect as a practical man who can urge and prove that more good is done by the retention of the full number of teeth in a crowded mouth, than by judicious extraction. Theoretically, it is no doubt highly desirable to keep the dental arch intact, and sedulously to avoid any disturbance of a denture in which the teeth articulate normally; but it is not difficult

to maintain, in the first place, that in crowded mouths the articulation is rarely quite normal, and is frequently much improved by extraction, and in the second place, that even where the "bite" *is* normal, the teeth may be so jostling one another, so weak in structure, and so extensively decayed, that it is far better practice to remove some of them bodily, even though by so doing one may disarrange the articulation and leave spaces which form receptacles for food, to the detriment of adjoining teeth, than to attempt to save every individual organ in the mouth of young patients often incapable of bearing extensive operations. I do not intend, however, to discuss fully the general question of extraction for the relief of crowded mouths; but taking for granted the wisdom of extraction when done with discrimination and due regard for the circumstances of each individual case, I wish for a few moments to consider the more limited question as to which teeth one's choice should fall upon for removal.

As a matter of fact it is an almost universal practice to get rid of the four first molars. Generally speaking this is, I believe, a rational procedure in view of the facts that these teeth are very commonly the most prone to decay, and that their removal gives a larger amount of room than the loss of any other tooth does. But in a

good many cases there are considerations, mainly concerned with the "bite," which contra-indicate the choice of the molar, and point to one of the bicuspids as the tooth to be sacrificed. These considerations are often overlooked, and in consequence the number of molars extracted is unduly swelled.

It ought never to be forgotten that the first molar is the chief grinding tooth. As a masticator it stands pre-eminent over the other teeth, its surface being usually larger than that of the other molars, and of course much larger than that of the bicuspids, whilst its position is uniquely favourable for the efficient and comfortable trituration of the food, it being far enough back to obtain powerful muscular assistance, and far enough forward to enable the tongue easily to keep large morsels of food between it and its antagonist. As far as its position is concerned, it may be urged that if extracted at the proper time the second molar takes its place, but this is only partially true, for though the second molar may come forward far enough even to be in contact with the second bicuspid, its vertical axis is almost invariably tilted forward to some extent, so that it does not squarely antagonise with its opponent, the distal portions of the crowns alone coming into close apposition.

Bearing this in mind, and considering that the

amount of space required in a crowded mouth is often not greater than the loss of four bicuspids will amply furnish, the comparative condition of molars and bicuspids ought to be most carefully examined and weighed at the time that extraction is decided on, and when it only remains to determine which tooth shall go. It will occasionally be found that the second bicuspid is in a worse condition than the molar, and it will often be found that its condition is nearly if not quite as bad, especially when it is remembered that the molar has had three or four more years of wear and tear than the smaller tooth. In these cases, providing that the molar is not so diseased but that it can be rendered a permanently useful tooth, the best course to pursue is the extraction of the second bicuspids. In addition to the advantages of retaining the molar which have already been pointed out, it may further be noticed,—first, that the loss of a bicuspid in its stead gives more immediate relief to crowded incisors and canines; and second, that given a molar and bicuspid equally diseased, it is, as a rule, much easier to save satisfactorily the former than the latter.

Turning back now for a moment to those cases in which the loss of the first molars is fairly indicated, it is nevertheless generally of the utmost importance that these teeth should be patched up and kept comfortable, and the extraction if pos-

sible delayed until the second molars are quite erupted, and this for three reasons: first, that if the extraction is done at an earlier date the health of the patient is seriously endangered by inability to masticate properly; second, that the second molars tilt less the later the extraction of the others takes place; and third, that early extraction may injuriously affect the position of the incisors by leaving them and only partially erupted bicuspids to bear all the strain of the "bite."

(2) "Raising the bite." In those cases of irregularity where projecting incisors are kept in their abnormal position by the close contact of the lowers, it becomes necessary partially to "raise the bite," that is, to induce, or allow of, growth upwards and downwards of the lower and upper posterior teeth respectively; so that the upper incisors, being relieved from the constant pressure keeping them out, may be brought into a better position.

The methods for accomplishing this vary in detail according to the circumstances of the individual case in hand, but a typical appliance for the purpose is a simple vulcanite plate made to cover the palate without capping any of the teeth. This being regularly worn for some time prevents the lower incisors from rising any more, their tips being made to impinge against the

vulcanite, whilst it allows of the molars lengthening. I have drawn attention to this class of case, because it is the "bite" of the lower incisors which, if not the original cause of the projection of the upper teeth, is the means by which it is maintained, and because unless close attention be paid to the "bite" generally throughout the conduct of such a case, its last state is likely to be at least as bad, and probably worse, than its first. For having, by means of the simple palate plate, obtained space between the upper and lower incisors, and having inserted an appliance for the retraction of the uppers, it is necessary to take measures against the lowers rising again, as they are always ready to do if left to themselves. If, for instance, the plate used in the retracting process is made to cap the molars, then it may be found that by the time the upper incisors have been brought into a normal position the lowers will have grown upwards, so that when the plate is out of the mouth they will forcibly press, as before, against the uppers. Therefore one ought, in such a case, to avoid capping the molars, in order to leave as little room as possible for the lower incisors to rise in.

In the correction of other forms of irregularity besides that just detailed, and in the use of retaining plates, it will often be manifest, if a

careful study of the "bite" is made, that the articulation will suffer from prolonged capping, and this method of holding regulating plates in place ought therefore to be cautiously employed. Where there is difficulty in obtaining a firm hold for plates without capping, appliances attached firmly to one or more of the posterior teeth by means of snugly-fitting collars and oxy-phosphate cement prove very useful.

(3) "Jumping" the bite. This unscientific but useful term is applied to an operation which, when it can be accomplished, is a very pretty one, and one which helps very materially to improve certain mouths. By its means such a sudden alteration is made in the whole articulation as to justify the use of the word "jumping." Its peculiarity consists in this, that whilst nearly every other regulating operation aims simply at altering the position of the teeth in relation to the jaw which carries them, this operation alters the relation existing between the jaws themselves — in other words, the bite is "jumped" by the lower jaw suddenly, in the course of a few days being made to close upon the upper in a manner entirely and markedly different to that in which it has been accustomed to close.

The operation is called for in cases where the upper incisors project, where the lowers bite far

behind them, and where, besides these conditions, the bicuspids and molars inter-articulate abnormally, the lowers closing too far back, by the whole width of a tooth, the chin being consequently very retreating, and the whole facial expression weak and foolish. What has to be done here, if possible, independently of some retraction of the upper incisors, is an alteration in the position of the lower jaw, so that the chin may be brought bodily forwards. This desirable end may be attained by various means. In a most interesting communication brought before the New York Odontological Society by Dr. Bogue and printed, with illustrations, in the *Dental Cosmos* of May, 1887, the bite was "jumped" simply by the expansion of the upper arch in the canine region. In this case it appeared that the distance between the upper canines—measured directly across the palate—being abnormally small, the lower teeth were simply unable to close in their proper position, and the whole lower jaw was kept back. The lowers biting as usual inside the uppers, but themselves forming an arch of normal width, the narrowness of the upper arch kept the lower back, so that when the former were expanded, the lower jaw as a whole, in the course of a few days, came forward and articulated in the usual manner with the upper. This result of expansion

in the upper canine region was quite unexpected by the practitioner in charge of the case, the actual state of things being indeed not apparent to him until pointed out by Dr. Bogue.

A somewhat similar case, at least in its unexpectedness and rapidity, occurred a short time ago in my own practice. Having drawn back some prominent upper incisors in a case with a markedly retreating chin, and desiring to keep them in position, I attached a retaining wire to gold caps made to fit the second upper bicuspids—the first molars being gone and the second scarcely long enough to furnish a secure hold. In order to prevent the bicuspids themselves being brought forward, instead of the incisors being held back, I furnished the caps with tiny inclined planes, directed downwards and backwards for the lower bicuspids to bite against. In a week's time I saw the patient and was not a little pleased to find, that not only had the end I had in view been accomplished, but the lower jaw had come right forward by the width of a tooth, and the retreating chin offended one's eye no longer.

It may be observed in both these cases, but particularly in the first, that the movement of the lower teeth was due, not to any active mechanical interference with them, but to a spontaneous action on the part of the lower maxilla, when

once it was set free from the abnormal position that it was locked in by the bite.

Mr. President and Gentlemen, in bringing my remarks to a conclusion I feel that, while I have occupied quite enough of your time, I have put your patience severely to the proof in bringing before you such well-worn topics. I fear that the somewhat ambiguous and pretentious title of my paper may have raised expectations that have been disappointed. I am sure that such a heterogeneous collection of notes strung together by so slender a thread as I have used is scarcely worthy to be offered to this Society, and I can only selfishly hope in leaving its inadequacies to your generous consideration that I at least may gain something from the wealth of experience and opinion which the very poverty of my paper may possibly call forth in discussion.

Discussion.

Mr. Ashley Gibbings desired to ask Mr. Matheson if he had seen any jumping of the bite resulting from the extraction of six-year-old molars. He had a case in hand in which the history showed that before the first molar was extracted the bite was normal. After extraction the lower jaw commenced to move forward and to one side. The patient was now using an apparatus capping the molars with an inclined plane so as to hold the jaw back and move it to the right side. The girl was now over fifteen years of age, and Mr. Gibbings was glad to say the bite had improved immensely. The upper canine was now behind, whereas before it was one-sixth of an inch in front of the lower canine.

Mr. Walter H. Coffin thought with regard to jumping of the bite, that the cases were very exceptional in which it took place to the extent of the whole width of a tooth. In many cases a jumping of the bite could occur without necessitating a movement of the teeth or jaw to this extent. When teeth are biting in one place normally, and abnormally or on the cusps in another place, a judicious extraction might produce what might be termed a partial jumping of the bite, resulting in a perfect articulation of the jaws.

Mr. James Stocken was quite satisfied that it was wrong to extract the six-year-old molar before the twelve-year-old molar had developed; if that was done a tilting resulted. He had only just received a case which was fairly represented by Mr. Matheson's diagrams. The lower jaw was projecting at least half an inch. He could not help thinking that the treatment of jumping was in this case just the one he should adopt.

Mr. Storer Bennett, being called upon by the President for his paper, said that he would very willingly defer it in order that Mr. Matheson's important paper might be fully discussed.

Mr. William Hern said there were two points to which he desired to draw attention. First, with regard to contour fillings: the gist of Mr. Matheson's advocacy was *for* contouring; when, however, a cavity was suitable for a contour filling it would be advisable to get a previous separation of the teeth, which would give room for knuckling back; as soon as the tooth was filled it would knuckle back to its position. Without a previous separation the tooth would be a constant source of annoyance to the patient. With reference to the jumping of the bite, both those cases mentioned had been where the lower jaw had come forward easily. Cases in which patients deliberately protruded the jaw would be known to everyone, and it should be borne in mind that it was almost impossible to retract it. The lower teeth would come forward in a very short space of time, and the glenoid cavity would adapt itself to a forward, while it would not adapt itself to a backward, movement.

Mr. Walter H. Coffin asked when an approximal cavity presented itself, and there was hesitation as to whether a permanent separation (flat or wedged) or contour filling should be adopted, he would like to know if Mr. Matheson had tried the method of inserting what was known as a "chewing bar." This bar was inserted between approximal cavities with a view of affording protection to the gum. He had seen cases of several years' standing where patients had expressed the greatest satisfaction with this method, but he had not himself had the courage or the audacity to adopt it.

Mr. C. Robins remarked that he had been brought up to believe flat fillings and V-shaped spaces between the teeth were very unorthodox, and until about eighteen months ago he had only adopted them with great caution. He was very glad to hear Mr. Matheson clear these points up. Where the contour had to be exaggerated, of the two methods he preferred the V-shaped spaces, opening a little wider on the lingual than on the buccal aspect. He would like to say one word in reference to jumping the bite. He had just had a case in which the patient

was fifteen or sixteen. The mother urged him to push out an instanding lateral, which he did, partially by expanding the arch. He got the teeth into a pretty position, but to his dismay the lateral would keep going in. This he afterwards found was due to a cusp-to-cusp bite opening the mouth, and so prevented any lower tooth from keeping the lateral in its proper position, but a little grinding with stones made the occlusion perfect.

Mr. Field said, with reference to contouring, ought they not to ask themselves the question, "What do we understand by contouring? Is it to restore the tooth to its normal contour? or is it to close up these large spaces?" If it were to restore the normal contour, he might say he had not seen cases which were prejudicial, perhaps with one exception, viz., those cases of unclean mouths and here neither flat filling nor contouring is successful. In all cases he should incline to contouring to give the best results. In regard to the chewing bar, he might give his own experience: patients were delighted with it as an aid to mastication, but he had seen very poor general results from its use. It necessitated too much destruction of good tooth substance, and without great care on the part of the patient the cervical margin of the tooth was apt to be undermined. The teeth were injured when the other end of the bar was put on by a cap, and when it was put in by a mortice, movement took place which loosened it.

Mr. Leonard Matheson in reply said, in reference to Mr. Gibbings' remarks, it would seem as if possibly his case might have been one of those in which the premature extraction of the first molar did the harm. He would like to know from Mr. Gibbings if the second molars had come through at the time when the patient was eleven years of age? He should imagine not. If not it was probably due to the premature extraction to which he had alluded. The lower incisors easily thrust themselves forward and push the upper incisors out. As regards jumping, he quite admitted, and gladly admitted, that there was a partial as well as a complete jumping of the bite. The two instances he mentioned were only given as striking examples of what might

be done—he repeated what *might* be done, because it was more or less a matter of chance in these cases. The dentist was not always the prime mover. He would always look at the position of the canines to see if the upper canines might be very close together, and in the second place, if they were widely enough expanded for the lower jaw to come forward. He was glad Mr. Hern had called attention to the importance of previous separation before contour filling. With regard to the chewing bar, he had had only a slight experience of it. He had used a substitute for it in the case of an old gentleman who had extensive approximal decay between the second and third molars on both sides—the teeth were very long, and food wedged up there. It would have been quite impossible to make a contour filling in such a position, so he thought the best plan with an aged man was to bridge across the cavity, and put over that a cap of gold. Mr. Matheson believed that on a former occasion Mr. Hepburn had suggested this plan. He should like to say that Mr. Robbins need not have apologised for grinding the teeth, that was in his opinion very often the best practice, and it would often save a regulation case.

With reference to the question of large contours *versus* spaces, it was often justifiable to make a large space, as where one gets small cavities at the cervical margin, with decay as a white film extending round the neck. It being then extremely difficult to make satisfactory contour fillings, he would feel justified in boldly cutting away sound tooth substance.

Votes of Thanks.

The usual votes of thanks having been duly carried, the President announced the next meeting of the Society would be held at 40, Leicester Square, on Monday, 1st December, at eight p.m., when Dr. B. Ward Richardson will read a paper on "Hæmorrhage following tooth extraction: its Cause and Treatment." Casual Communication by Mr. Trueman, "A Case of Eruption of a Tooth under the Chin." Mr. J. O. Butcher will shew new engine attachments.

Odontological Society of Great Britain.

ORDINARY MONTHLY MEETING

December 1*st*, 1890.

MR. FELIX WEISS, L.D.S.,

PRESIDENT, IN THE CHAIR.

THE Minutes of the preceding meeting having been read and confirmed,

Mr. ROBERT WYNNE ROUW, L.R.C.P., M.R.C.S., L.D.S.Eng., signed the Obligation Book and was admitted a Member of the Society by the President.

Messrs. THEODORE WILLIAM HARRIS, L.D.S.Eng., 10, Cavendish Place, W.; HENRY L. ALBERT, M.R.C.S., L.D.S.Eng., Sloane Street, Chelsea; ARTHUR WYNDOWE WILLERT BAKER, M.D.Dub., F.R.C.S.I., L.D.S I., 18, Lower Fitzwilliam Street, Dublin; were nominated for Membership.

Mr. WILLIAM JOHN FISK, 181, High Street, Kilburn, was balloted for and elected resident Member.

The CURATOR (Mr. STORER BENNETT) reported that Mr. Phillips (a former Vice-President of the Dental Hospital) had presented to the museum three ancient instruments, viz., an old pair of forceps, an old elevator, and a double action key without a handle.

Mr. Truman narrated "a case of eruption of a canine tooth under the chin." The patient was a little girl, aged six and had a left lower permanent canine erupted below the chin. The history of the case was, that three or four years ago she had diphtheria very badly. When she was convalescent, about a fortnight after, the lower jaw began to swell uniformly and an abscess formed discharging a good deal of pus. Soon after two teeth were extracted liberating a quantity of pus, and a sequestrum separated, when matters seemed to quiet down. Subsequently, however, four pustules appeared on the chin; these burst, leaving sinuses from which necrosed bone came away. Three of these healed, while from the fourth, eighteen months later the left lower permanent canine appeared.

Referring to similar cases recorded, Mr. Truman mentioned a specimen of a lower wisdom now in the Society's museum; also a case given in Mr. Salter's book, viz., both superior lateral incisors appearing in the nostrils. There was also a skull in the museum of the Royal College of Surgeons which showed the eruption of an upper right canine tooth into the nostril. Mr. Matheson had told him of two cases, one, that of Dr. Ward Cousins. In this a temporary left canine had become encysted in the left orbit, and, so far as Mr. Truman could understand, the tumour was removed. In another case under the care of Mr. Carver, of Cambridge, a boy, six and a half years old, had a canine coming through the right lower eye-lid. This tooth had commenced to erupt at four and a half.

Mr. Storer Bennett said that it would be recollected that during the year of the presidency of Mr. Charters White a number of skulls and jaws of prehistoric man, taken from a Wiltshire barrow, were shown. One of them was the lower jaw of a child, in which there was a partially developed lower canine tooth inverted; this had not pierced the jaw; the crown and a small portion of the root had been developed, and the crown pointed downwards.

Mr. Morton Smale said three or four years ago a case had occurred at the Westminster Hospital of a permanent

canine erupting into the nostril. The patient's age was seventeen or eighteen. The tooth was removed through the nostril. The important thing was to account for the tooth becoming inverted and presenting itself in this position. So far Mr. Smale had not met with anyone who could satisfactorily explain it.

Mr. F. Newland-Pedley mentioned having removed a canine tooth through the nostril. In that case the patient had a harelip.

Mr. Wm. Hern stated that a little patient, the subject of harelip and cleft palate, was now attending the Dental Hospital. He had seen the patient on several occasions, and about six months ago removed a supernumerary tooth from the nostril. The case was similar to that mentioned by Mr. Newland-Pedley.

The President remarked that many years ago a lady came to him wearing an artificial denture which she had worn for years. Underneath the lower plate he found two canine teeth lying horizontally on the gum. They were perfectly formed and perfectly clean.

Mr. F. J. Colyer showed the model of a case in which the canine had erupted underneath the tongue. The patient, a female, aged thirty-five, gave no history and suffered no inconvenience.

Mr. Wm. Hern said that he had a model of a case of a misplaced canine. The patient was a young woman who applied at the Middlesex Hospital, complaining of the looseness of the left upper lateral incisor. Necrosis was found to exist, and after removing the tooth and a small portion of the anterior wall of the socket, he came upon a white hard body imbedded almost horizontally in the jaw in an oblique direction. In Mr. Truman's case there was also a history of previous necrosis following diphtheria. So it seemed to Mr. Hern that necrosis might have been the cause of the inversion.

Mr. W. H. Woodruff mentioned two cases in his own practice which occurred almost simultaneously. One, a canine occupying a horizontal position on the outer portion of the arch and above the roots of the other teeth, and the other growing quite up in the palate and also in a horizontal position. In both these cases the patients were between seventy and eighty, and the abnormality had given no pain up to that time. But at the time of consulting him they began to give considerable trouble, and he was fortunately able to remove both.

Mr. J. O. Butcher showed a new holder for the handpiece of the dental engine, made of a piece of stout wire bent roughly in the form of a corkscrew spiral, which allows the cable to drop into it freely and to be easily removed when wanted. It is more effectual than the clip usually sold with the engine, and has not the disadvantage of the clip, which becomes weak and almost useless after some time. He had used it for about two years, and had found it much more convenient and handy than the clip.

Mr. J. Ackery commended the device.

Mr. Morton Smale showed two obturators designed by Dr. Brandt of Berlin; one for use in cases of congenital cleft palate: the other in cases of unsatisfactory staphylorrhaphy. The principle was that of a small india-rubber bag, attached to the artificial palate, which is put into the mouth in a flaccid condition and then inflated.

The President remarked that their great advantage was that they were not likely to create irritation. He should doubt their durability.

Mr. Morton Smale said they were so cheap that their durability was of no importance.

Dr. Richardson was then called upon to read his paper.

On the Causes of Hæmorrhage after Tooth Extraction and the Immediate Treatment.

By Benjamin Ward Richardson, M.D., F.R.S.

Mr. President and Gentlemen,—Thirty-two years ago I delivered before the then existing College of Dentists a lecture on hæmorrhage in its bearings on the practice of dentistry. This lecture, very favourably received at the time, and very often quoted since in works of general as well as dental practice, largely increased my after experience of the subject on which it treated. Every year brought me into contact with new cases and new facts, and I find, on reference to notes taken in the year 1871, that I was called six times during that year to arrest hæmorrhage after tooth extraction. This was exceptional; but, altogether, spread over the long term of practice I have passed through since 1850, and excluding seven previous years of preliminary medical studies, I must have had from one hundred and twenty to one hundred and thirty instances of hæmorrhage under my care. It is from the study of this experience I shall venture to speak to you to-night, and if I succeed, I

shall be gratified. If I fail, I shall, Sir, throw all the blame on you for having chosen the subject.

The subject is essentially practical, and to deal with it in a practical manner I shall divide it into two parts, namely: Cause and Treatment.

Preliminary Note on Comparative Rarity of Hæmorrhage at the Present Time.

At the outset I should like, however, to make an observation which nothing except a long experience could supply. I am quite sure that the accident of hæmorrhage after extraction of the teeth is much less frequent than it was a quarter of a century ago. At that time it was, comparatively, a common accident; at the present time it is a comparatively rare accident. For my own part I have never had a case which ended fatally, although two or three have approached very near to a fatal termination; but I knew, before the period I have named, of more than one death from the hæmorrhage. Since that time I have not known of one fatality, and the occurrence of bad cases is much limited. There is not the least reason for surprise at this fact, for many causes are at work leading to it. In the first place, the progress of dental surgery is greatly advanced; the rude method of operating with

the key or with coarsely constructed forceps has ceased. Secondly, the knowledge that different teeth call for different modes of manipulation or different instruments—knowledge once altogether confined to a limited few—is general knowledge and practice. Thirdly, the means to be adopted to stop hæmorrhage, if it be developed, is much more accurate than it used to be. The operator has gained confidence, and, with that, coolness and patience in endeavouring to arrest the flow of blood—elements of treatment of the supremest importance. Beyond these advancements there is yet another, which probably ought to stand first. I mean that what we physicians call the hæmorrhagic diathesis is greatly reduced amongst the members of the community. This is one of the most striking facts of our civilization—so striking that I am rather surprised it should have been left to me to call attention to it. In plain words, the blood of the nation has improved in quality. What was termed scurvy was not long ago a prevailing condition. There was land scurvy and there was sea scurvy. Now both are much less common. But the scorbutic state induced in all cases by an improper diet, or descending by heredity from parents who have been badly fed and badly nourished, meant above all things else poor blood, blood that would not coagulate or seal up the broken vessel. Such

blood was made by bad food; it was also made by bad drink, for it is the blood of an intemperate community, and bad food and bad drink having to some extent been dismissed and replaced by wholesomer substances, the blood is of better substance, is a sealing blood, and ceases to flow out of minute vessels less seriously, because it makes for itself the best of all plugs in its semi-solid or coagulated form.

CAUSES OF HÆMORRHAGE.

Coming now to the practical part of my subject I cannot do better than reconfirm a position I originally maintained, namely, that there are three distinct conditions leading to dangerous hæmorrhage after extraction of teeth: (1) abnormal fluidity of blood in the subject submitted to operation—purpuric hæmorrhage; (2) deficient contractile power of the divided vessels—vascular hæmorrhage; (3) Mechanical lesion favouring the flow of blood—mechanical hæmorrhage.

Hæmorrhage from Fluidity of Blood.

We must bear in mind what has been said above relative to the present comparative rarity of this form of hæmorrhage. Although much less common now than formerly, hæmorrhage from fluidity still occurs. The examples of it

divide into two classes—(*a*) the *aqueous* and (*b*) the *scorbutic* or *saline*.

The pathological character of the *aqueous* type is special. The blood of the patients who are subject to it is in a state of extreme fluidity, the fluidity being due to an excess of water, so that the plastic parts of the blood, and also the saline parts, are dilated in an unnatural degree. I do not know of any proof that in these cases there is an actual deficiency of fibrine. If there were, the muscular structure of the patient would probably undergo some modification—a condition by no means necessary, since the disease may be seen in persons whose muscular development and muscular power is good, if not actually perfect. But in the blood the relative natural proportion of water to the colloid matter is disturbed; the water is in excess, the cohesive attraction between the particles of the colloid is reduced, and the blood, imperfectly protected by the plastic fibrine, is ready at any weak point to escape, to run from the vessels in a fine stream, or to diffuse, in the form of purpuric clot, into the peripheral surfaces of vascular organs or over the surface of membranes.

In one instance in which the purpuric state was connected with serous dropsy, I caught a few ounces of blood flowing from a vein of the

patient. The blood had a specific gravity of 1,035, or only 15° above the specific gravity of the ordinary renal secretion of the same patient. The blood yielded no clots on agitation; the corpuscles were large, pale, and globular; the amount of water was increased to 860 parts in 1,000, while the fibrine was reduced, relatively, to 1 part in 2,000.

The eruption which accompanies most cases of aqueous purpura is in some cases not developed at all, although the conditions for its manifestation are strongly present. The patient knows that his blood will flow with dangerous freedom if he prick or cut himself, and he will tell you of members of his family who bleed in a similar way; but he may not have any eruption, and may pass through life suffering from what is called the purpuric diathesis. The reason of this is that the colouring matter of the blood is retained by the red corpuscles, and that the fibrine is equally diffused through the volume of blood. The blood consequently makes its course freely until some other factor intervenes. A prick, a slight blow, may be all-sufficient for this purpose, or even pressure induced by the dress. I had one patient in whom a sudden exposure to cold would bring out a characteristic purpuric eruption. In these persons, if the skin be frozen in a small point by ether spray,

the purpuric spot will follow, and I have found this a valuable mode of diagnosis in the obscurer forms of the disease.

The eruption is easily developed by other causes in those who, from the condition of their blood, are prepared for it. Excess of alcohol or excessive mental or physical fatigue will induce it. The character of the eruption when it occurs is distinctive—it is diffuse, irregular, and faint. It partakes of the character of a superficial bruise, and it passes through the phases of colour presented by an ordinary bruise, but unattended by swelling.

What has struck me often is the immunity with which persons affected by aqueous purpura go through life. They sometimes carry with them exceeding good looks; they are fairly strong; and they are usually well nourished. If they suffer from great loss of blood, they recover rapidly when the bleeding has been checked, and even regain colour. I doubt, however, whether in true examples of this disease the blood ever becomes of natural quality.

The remote origin of this example of purpura from extreme fluidity of the blood, will, I believe, be ultimately found to be central and nervous. It is among the most marked diseases of the hereditary type and the hereditary quality of the malady is generally diffused

through a number of members of a family to an extent specially striking. I was called a few years since to arrest hæmorrhage after a tooth extraction in one of these subjects, and I found that four members of the family had suffered from aqueous purpura. One had died from loss of blood from a leech bite; another had marked purpuric eruption; two had suffered hæmorrhage from the gums, and had shown purpuric spots; and my patient all but died from the escape of blood, which was practically uncoagulable, until syncope from actual loss of blood supervened. In two other cases which have come before me in which no decided hereditary tendency could be discovered, the patients—in both cases adults—attributed their disease to mental causes—that is, to causes acting intensely on the mind. One attributed the disease to a severe fright occurring during childhood; the other to sudden and excessive grief. I believe both were correct in their surmise, because they based it on clear and reasonable evidence of facts. But how the blood can be physically modified by mental shock I do not assume to know.

The summary of this condition runs as follows:—There is usually a history of hæmorrhage of fluid blood caused by very slight wounds and restrained with difficulty. There is a history either of hereditary disposition to the disease, or

of its induction by some nervous shock or injury. The blood is very fluid when taken from the body, and does not coagulate. The corpuscles of the blood are large, and deficient in central depression. The specific gravity of the blood is low, and the specific gravity of the urine is low. The eruption on the skin is not a persistent symptom, and when it appears it consists of a diffused blotch resembling a bruise, with neither swelling nor hardness. The eruption is brought out by any cause that for a moment paralyses the vascular tension. It is brought out readily by extreme cold. The patients themselves are not, as a result of the disease, in an emaciated or enfeebled condition, and they do not bleed from open surfaces, except when the vessels are divided. In other words, their blood does not exude through closed vessels, but it easily flows from a wounded point, as from a prick or the suction of a leech.

If all patients who came before the operator carried with them this history there would be no obscurity. The operator would know with what he was dealing, and would probably think it wise not to accept the risk of an operation. Indeed more than once I have been consulted on the propriety of operating under such circumstances, and on one occasion gave a verdict against operating, which I had occasion to know

saved the gentleman who consulted me the most terrible anxiety, for that patient soon afterwards died from hæmorrhage from a slighter cause than tooth extraction. Unfortunately it may happen that no such preliminary history is supplied, and then we get the true typical case, two illustrations of which I will give—one from the practice of Dr. Roberts, of Edinburgh, most faithfully recorded by him, the other from my own practice.

Dr. Roberts' patient was a Mr. Pen, a man of middle age and full habit of body. He came to Dr. Roberts to have a loose wisdom tooth removed from the right side of the lower jaw. The tooth had three small fangs, the anterior one the largest. The hæmorrhage, not more than usual, stopped before the patient left the house, the alveolus being plugged with lint wetted with camphorated spirit of wine. At half past four of the same day Mr. Pen called again on Dr. Roberts, the blood flowing in full stream from the alveolus. Plugging with lint and firm pressure with a cork was now adopted, together with astringent lotions. By this means the bleeding was staunched, so that the saliva came away from the mouth uncoloured. The patient now informed Dr. Roberts of his history, viz., that he had had a tooth taken out before, and that there was then considerable hæmorrhage, which lasted for three days, but was assisted by the application of caustic ; he also re-

ported that his gums had bled to a considerable extent, and often for a fortnight at a time. On Monday morning, one day later, Dr. Roberts was sent for, and found that the bleeding had continued all night, and that there was neither clot in the alveolus nor in the blood which was spat out. Caustics and solutions of lead and alum were now applied with benefit, and for an hour all appeared safe. In the course of the day Dr. Hay was called in, and finding the hæmorrhage still present he applied the actual cautery. Afterwards, with an iron button properly adapted, Dr. Roberts applied the actual cautery, but with no better result. In the act of applying the cautery the second time the patient started, and the under lip was slightly burned. From the wound thus produced blood oozed freely for several days. Attempts to check the bleeding were vain until Wednesday, when the loss was more severe, and indications of syncope supervened. Towards the evening there was some improvement, the hæmorrhage being under control by simple pressure. Mild purgatives were given in consequence of a considerable quantity of blood having been swallowed. On Thursday there was sinking, and although the hæmorrhage from the alveolus had ceased there was hæmorrhage from the gums and from the left nostril. From this time until December 31st there was improvement,

when suddenly there was a change for the worse; there was slight hæmorrhage from the nostril, gums and alveolus, which continued. The gums were very turgid, of purple colour, and almost covered the teeth; the features were collapsed, the cheek was discoloured, and all the symptoms of purpuric hæmorrhage were decided. Death put an end to this painfully interesting case on Tuesday, three weeks and two days after the operation.

The case thus recorded is typical, and is of the purest type. Of its kind it is the truest example I have met with anywhere, either in reading or practice.

I was called in the year 1869 to a young lady between sixteen and seventeen years of age. She had enjoyed the best of health; had been brought up in a healthy, natural way; had taken abundance of outdoor exercise, and had been tended with all the care devoted to an English child much beloved by friends, whose means extended to wealth.

This patient was obliged to lose an upper molar tooth on the left side. The tooth had undergone rapid decay, and all attempts to preserve it were useless. The extraction was easy, and was performed with his usual skill by one of our most accomplished operators of the metropolis. At the time there was rather more bleed-

ing than is usual, but so entirely free was she from any sign of ill-health—there was not so much as an anæmic cast—no notice was taken of the hæmorrhage. The hæmorrhage soon ceased of itself, and gave rise to no symptom either of syncope or of exhaustion.

The tooth was extracted about midday, and all went on well until the evening, when, during the excitement of dancing, blood began to flow from the alveolus. The blood as it flowed gave no sign of clot; it was of red colour, but thin, and was wanting altogether in plasticity. The loss of blood continued for many hours, until, in short, dangerous signs of exhaustion showed themselves, and on my arrival there was some cessation of the hæmorrhage from exhaustion of the propulsive power of the heart. In this state I succeeded in plugging the alveolus so firmly with styptic colloid on cotton wool that when the patient began to recover the bleeding did not return. Three nights afterwards, during sleep, my patient, by mere accident, moved the plug in the alveolus, when once more there flowed forth the fluid blood. Happily, again during semi-syncope, I succeeded in sealing up the bleeding surface with the same kind of styptic stopping, and by the exercise of extreme attention the surface healed without the recurrence of hæmorrhage.

The patient herself in this case afforded no external evidence whatever of her peculiar diathesis, but her family history told the story. Her infant brother had lost his life by the escape of blood from a small injury to the skin.

The second form of purpuric or hæmorrhagic blood to which I would direct attention I designate as the *saline* type. In this type there is no deficiency of plastic matter in the blood, but an extreme fluidity due to an excess of soluble saline material. The synthesis of this disease was well brought out in my early experiments, in which the blood of lower animals was rendered preternaturally fluid by administration of alkaline salts. The distinguished Huxham observed a similar condition in the human subject in the case of a man who habituated himself to the taking of bi-carbonate of ammonia until his blood became permanently fluid. The same condition has, again, been observed on a large scale in the scurvy produced by too long a subsistence on foods preserved by salt, and especially when under such foods the body has been exposed to extreme cold, as in Arctic explorations. The same condition may also be observed in certain advanced stages of alcoholic disease. Very soon after the introduction of chloral into medical practice and its use by the chloral *habitués*, I met with a case of purpuric chloral eruption, a

saline purpura caused, as was easily explained, by the accumulation in the blood of the sodium formate resulting from the decomposition of the chloral in the body. I have now seen four instances of saline purpura so induced.

In these cases the specific gravity of the blood is increased, and the attraction of cohesion in the fibrine is suspended by the presence of an agent which holds the water in too close combination with colloidal matter. In this condition the fibrine, the albumen, and the colouring matter of the blood all diffuse through the membranes, and the exudation of blood at feebly resistant surfaces is easily effected; hence the bleeding spongy gum in well-marked illustrative forms of this malady. Persons suffering under saline purpura are the true scorbutics of the older school of physic. They supplied the patients whose blood, when our forefathers drew it, as they usually did, was seen to separate, while it was flowing, into fibrine and serum, just as fibrine separates when we precipitate the corpuscles by adding a saline solution to blood newly drawn.

There is in this form of purpuric disease no necessary evidence of hereditary tendency. On the contrary, the malady is usually caused by error of diet or toxic habit.

The eruption, when it occurs in saline purpura, is more sharply defined as a spot, *macula*, than

in aqueous purpura. It is not induced by an injury, but breaks out spontaneously. Often there is no eruption; but there is always a tendency of exudation of blood from the gum, from the throat, and occasionally from the lung.

The summary of this condition runs as follows: —There is no necessary history of hæmorrhagic or fluid blood, nor yet of hereditary disposition to such hæmorrhage; but there is always a history of an induced morbid condition from error in diet, exposure to some noxious agent, or disintegration of blood from disease. The blood is fluid when taken from the body, but from its fibrine separates, and the corpuscles are shrunken and crenated at their edge. The specific gravity of the blood is high, and the specific gravity of the urine follows the same rule. The tendency of the blood in these cases is to exude from the soft spongy surfaces, as from the gums; and if an eruption present itself, it is in the form of maculæ or petechiæ. Transudation of blood by the mucous secretions is not an uncommon diagnostic fact of this type of purpura. Venous murmur is also not uncommon as another point of diagnosis.

I have seen very few examples of hæmorrhage from this class after tooth extraction, a fact easily accounted for on the theory that few operators care to operate under such unfavourable con-

ditions. One instance, however, came before me in which profuse hæmorrhage at the time continued for several weeks, ceasing at last under constitutional rather than local treatment.

Vascular Hæmorrhage—Hæmorrhage from Deficient Contractile Power of Blood Vessel.

What I call vascular hæmorrhage is a form of hæmorrhage after extraction of the teeth in which the fault lies in a primary want of contractile power of the blood vessel—artery—divided during the operation. In perfectly healthy states of the body, in addition to the process of solidification of blood, the obstruction from the contraction or shrinking of the divided vessel is a powerful agency in arresting hæmorrhage. Moreover, the act of removing a tooth is favourable, because the vessel is not cut cleanly across, but is torn, by which the contraction of the coats of the vessel is greatly increased. At the present time our surgeons are practising a mode of arresting hæmorrhage, even from very large arteries, by what is called the torsion method, and which consists, in fact, of seizing the artery with a pair of strong forceps, pulling it gently forward, and twisting it firmly. This same process the dentist carries out unintentionally to a considerable extent whenever he extracts a tooth,

and there can be little doubt that the rarity of severe flux of blood after operations on the teeth is partly accounted for by this circumstance.

There exists, notwithstanding, a distinct class of cases in which there is copious hæmorrhage, owing to absence of true contractile power of the arterial tube, and there are constitutional conditions leading to this particular state of vessel. The vessel is torn across and does not contract, whereupon the blood continues to flow with sufficient freedom to wash away any clot that may be formed and give rise to copious hæmorrhage.

There are three or four classes of persons who suffer from hæmorrhage of this character on slight causes. In the largest class a slight physical accident on the body is apt to produce a discoloured spot or bruise with swelling, and after a time firmness of structure at the point of the swelling. These subjects are usually well nourished and young. They are disposed to be fat, and if they are carefully inspected while undressed they are found to possess some deformity of body more or less marked. The spine will show a slight curvature, or a lower limb will be a little distorted, or the chest will be badly developed or misshapen. The blood may, however, be perfectly natural, and there may be no hereditary hæmorrhagic diathesis. If a little blood be drawn for examination, it is found to coagulate

quickly and firmly. The colour of the blood is natural, and the corpuscles are of normal size and outline. There is, in fact, no definable disease of the blood.

In other examples of this type of hæmorrhage, the patients are what is called anæmic or bloodless, and it has been customary to look upon these as persons in whom the blood is unusually fluid. This is not strictly the fact. Such persons, it is true, bleed readily from slight causes, but not because their blood is necessarily deficient in power of coagulation. The clot formed by their blood may be loose and yield a large exudation of water, but it coagulates in sufficient degree to play an important part in checking the flow.

In a third class of vascular hæmorrhage the effect of alcohol plays the leading part. The subjects here are free partakers of the subtle poison. They are generally in the middle period of life, and present all the evidences of alcoholic constitutional change—the vascular cheek, the excitable, feeble heart, and nervous uncertainty.

A fourth class coming under this order are victims of syphilitic disease, the influence of which on the structure of blood vessels is so marked that at Netley Hospital there exists a whole series of specimens of arterial degeneration from this cause.

In all these varieties the blood may retain its power of coagulation and in all of them the free hæmorrhage is traceable to vascular deficiency. Either the minute vessels are paralysed, or there is some degeneration of structure in them so that they permit the blood to flow through them under slight mechanical injury, innervation or degeneration.

In summary, the subjects of vascular hæmorrhage are persons of enfeebled constitutional and nervous type, showing relaxed circulation in sudden blushing and suffusion of the face, with other signs of relaxed peripheral circulation; or, they are anæmic, or alcoholic, or victims of specific degeneration.

It has befallen me to have illustrations of all these types of hæmorrhage. In two cases of anæmia the symptoms were extreme, although recovery took place. In one instance of alcoholic form the patient, a lady, was brought from the dentist's chair to my house in a carriage and was treated with the utmost difficulty, owing not so much to a loss of blood as to her own restless fears and rambling resistance to everything that was being done for her. In one of the examples of specific disease such was the degeneration of the upper maxillary bone and palate, as well as of the blood vessels, that *in extremis*, while the patient was in syncope I cut away with a fine saw the

whole of the hard palate, and so reaching the anterior palatine artery which was yielding the blood, stopped the effusion by torsion and so controlled the hæmorrhage that the patient ultimately recovered and is still alive, twenty-four years after the event described.

In both these cases I was aided by the circumstance that the blood coagulated, and I dwell on them in order to draw the distinction between purpuric hæmorrhage and vascular.

Mechanical Hæmorrhage.

It remains for me only to mention under the heading of cause the last-named division—hæmorrhage from mechanical lesions favouring the flow of blood. These are lesions due to accident connected with the extraction, fracture of alveolus or tearing away a portion of alveolus. I have once or twice known this accident, but in my experience it is extremely rare as a cause of hæmorrhage, and as the treatment is the same as for vascular hæmorrhage I need not dwell upon it more than to say that in the worst example I have seen the tooth was so firmly adherent to its socket that nothing but removal of a portion of alveolus could have secured the extraction. The hæmorrhage was profuse but controllable, and no serious injury resulted.

THE QUESTION OF TREATMENT.

We come now to the all-important question of the immediate treatment of the cases under consideration. It is unnecessary for me to trouble you with any thoughts or suggestions as to ultimate or constitutional treatment. It will be most profitable to consider how best at the moment the dentist can stop the flow of blood and let his patient depart from his care quite secure. It will be inferred that in the cases already commented on, various remedies have been adopted, and I am sure that I must have seen twenty or more tried with more or less of success. My desire is to name the simplest and the best in the short time still at my disposal. In my early practice, on being summoned to a case, my instant attempt was to stem the flow of blood, without enquiring too minutely what was the cause of the accident. By and by I found that there was rarely any great reason for hurry; that it would take a long time for a person to die from the loss of blood, and that faintness was not such an anxiety as some make of it, but rather assisted the action of remedies, because it relieved the tension of the circulation, and made it easier to manipulate on the point from which the hæmorrhage proceeded. Gradually I found certain reliable steps, which I now follow, and which I think should always be followed.

In the first place, it is essential to ascertain if the blood that is being lost is or is not coagulable. If the blood is coagulable, if a little of it caught in a cup or glass goes into a firm clot in the course of two or three minutes, much cause for alarm is removed, and the line of treatment is sufficiently clear. We may be sure in such a case that the cause is either vascular or mechanical, that there is failure in the contraction of the bleeding vessels, or adhesion of the vessel to the surrounding bone tissue, or rupture of an abnormally large vessel. Whichever it may be there is the assurance at hand that the blood is in a favourable condition for forming a plug, and that if it can be retained in the cavity a sufficient time to enable it to form a firm clot it will produce a natural arrest. I shall deal with this simple treatment first.

Treatment of Vascular and Mechanical Hæmorrhage.

This treatment includes three methods. (1) The styptic. (2) The plug with pressure, with or without styptic. (3) The cautery. In the beginning of my practice I trusted mainly to styptics in this class of case, and after many trials I came to the conclusion that nitric acid was the best. I believe still, that as a styptic it is the best, but it has the disadvantage of being

very difficult to manipulate with, owing to its extreme caustic and destructive properties. I afterwards invented styptic colloid, which is composed of tannin in collodion, with addition of tincture of benzoin; and for ordinary cases I do not know of a better. The colloid can be applied on cotton wool and a firm plug of it can be inserted with much facility. When this did not seem sufficient I resorted to perchloride of iron applied in solution with cotton wool. It has often happened that these simple methods have proved effective, when they have not I have proceeded to the second plan, that of the plug with pressure.

Three kinds of plugs have been used. One is made of soft, well-teased cotton wool saturated with styptic colloid. The mass is not put in in too moist a form, but mixed in a cup is allowed slightly to dry by the evaporation of the ether. Then, after well drying the bleeding cavity with a pledget of lint, the colloid cotton is inserted with forceps, the point of which has been dipped in olive oil, layer by layer, as in a process of roughly stopping a tooth, until the cavity is completely filled. A little bit of dry wool is next made to cap the whole, and pressure is made with the finger or with Harding's compress until the plug is solid, which, owing to the escape of ether, is rather a quick process.

A second plan is to use a perchloride of iron

plug made by saturating cotton wool with solution of perchloride of iron, and then drying the cotton down. Cotton so prepared can be kept in bottles ready for use, and can be applied as a plug in a similar manner as the colloid. I have also constructed what may be called the *wick styptic*, and this is very useful in minor cases. It consists of a glass tube having a narrow point, through which is drawn a piece of cotton wick saturated with perchloride. A portion of the wick projecting from the narrow end of the tube can easily be inserted and firmly held in the cavity; when it becomes saturated with blood it can be cut off, a new bit pulled out, and a fresh application made.

The best plug of all I have been able to construct is a gutta-percha styptic plug. It is very convenient, and is easily kept at hand for an emergency as a disc. The discs, here named, consist of gutta-percha saturated with a styptic, tannin or perchloride of iron. One of these discs, picked up by the forceps and held for a short time in hot water, softens and becomes so malleable that it can be inserted into any cavity. The bleeding tooth cavity is quickly dried with absorbent cotton wool, and is then filled with the plastic styptic, pressed firmly down to the bottom and held there until it becomes firm. There is no fear of putting in the plastic styptic too hot,

since heat favours coagulation. I have placed a few of these styptic discs before the Society, this being the first time on which I have brought them into notice.

Treatment of Purpuric Hæmorrhage.

The lines of treatment above-named are required for cases of mechanical hæmorrhage, in which the blood is naturally coagulable. I therefore pass at once to consider the management of those more serious accidents in which the blood is deficient in plastic quality. I need not dwell long on this matter, because my mind is made up in regard to treatment. Presuming that the blood flowing from the injured part shows no tendency to clot and is discharged in a steady stream, which is not arrested by pressure or the ordinary application of styptic, it is necessary at once to produce secondary or albuminoid coagulation. It must be remembered that no blood is so constituted that it cannot be made to coagulate. In the most fluid blood there is albumen, which will not become solid spontaneously but can be solidified by various means artificially. Three of these means we have at hand, namely, tannin, perchloride of iron, and the subdued actual cautery. It may be well always to try the two first-named styptics, and in the perchloride percha styptic

and the percha tannin styptic, to some extent, we have substances which will coagulate albumen, even when they are not heated, and will instantly coagulate if heated to 150° Fahr. These, therefore, are very ready in emergency. If they fail, no time should be lost in resorting at once to the cautery. When the electric cautery is at hand, it is the most convenient; it does not alarm the patient, and the heat of the terminal probe is sustained in the cavity; but if the electric cautery be not at hand, the next best is the small iron cautery, an iron bulb terminating in a rounded point and fixed in a strong handle at an oblique angle. This bulb and point can be made red-hot in the flame of a spirit lamp or of a gas jet. But it is not necessary to alarm the patient by using it while it is in a state of glow. It may be allowed to cool down until all redness has disappeared and can then be inserted deep down into the bleeding cavity. Skilfully used it gives no pain of moment and its effect is, as a rule, immediate in the arrest of blood. Should it fail there is no other direct local measure that can be depended upon. Even ligature of the carotid if the case should come into the hands of the surgeon would be a doubtful measure, since hæmorrhage from the surgical wound might be uncontrollable and simply add to the danger.

Happily, for my part, the danger has only once pressed to the extent of suggesting so extreme a measure, and then the hæmorrhage was stopped by the cautery and did not return. In other cases, four in number, the cautery has acted at once. It is a remedy applied with unusual readiness if the idea of fear of it be not exaggerated. It should never be used at such a heat as to destroy structure. The coagulating power of heat over albumen, viz., 140° F. is all that is required strictly, but this may be safely exceeded to 150 or 160 degrees.

Before I conclude there are two other topics to which I must call attention. It is customary when the accident of hæmorrhage occurs for the operator, or for some bystander, to administer wine, brandy, or some other alcoholic stimulant to the patient, under the false idea of sustaining the vital power. It is my solemn duty to protest against this practice on the strictest and purest scientific grounds. The action of alcohol, under such circumstances, is injurious all round. It excites the patient and renders him or her nervous and restless. It relaxes the arteries and favours the escape of blood through their divided coats. Entering the circulation in a diluted state, it acts after the manner of a salt in destroying the coagulating quality of the blood; and above all other mischiefs, it increases the action of the

heart, stimulating it to throw out more blood through the divided vessels. These are all serious mischiefs but the last named is the worst. In hæmorrhage the very keystone of success lies so much in quietness of the circulation that actual failure of the heart, up to faintness, is an advantage; it brings the blood at the bleeding point to a standstill, enables it to clot firmly, when it has that tendency, and so to form the most effective possible check upon the flow from the vessels. In the case I spoke of in which I removed the hard palate the quantity of blood lost during the hæmorrhage amounted to over three pounds weight, and the syncope was so extreme that the patient did not know that anything had been done to him after he returned to consciousness. But not a drop of any stimulant was administered him at any stage, and the care to avoid any such administration was carefully sustained after recovery, in order that the rapid action of the heart might not overcome the resistance of the tenderly sealed up vessels. Indeed, I am certain that this rule of avoiding stimulation was far more effective in saving my patient's life than any urgical skill of mine, for the vessel I twisted might have become plugged up naturally during the syncope, but nothing would have prevented the bleeding from breaking out afresh if the heart, instead of being allowed to swing round of

itself slowly and safely, had been whipped, for a brief period, into violent action. I refer to this case as typical, because if a stimulant was not wanted in it, a stimulant cannot be called for in examples less severe. The course followed in that case was to lay the patient quite recumbent when signs of faintness supervened, and so long as he could swallow to feed him with warm milk and water freely. This, in my opinion, is the proper treatment to be employed in every instance of syncope from loss of blood.

The second concluding topic has relation to the effect of blood swallowed by patients who are bleeding from the mouth. In all bad cases of hæmorrhage from the mouth some blood is almost, of necessity, swallowed. The act sometimes gives cause for undue alarm, and it invariably alarms the patient. At first I was a prey to some alarm on this score, but experience has shown that the anxiety is groundless. The fact of a person swallowing a good many ounces of blood is not necessarily injurious. The blood is digested and is re-assimilated if it be not carried into the stomach in too large a quantity. When it is carried in in too large a quantity it is usually vomited, with a return of faintness, from which, however, I have never observed any serious danger nor recurrence of bleeding if that has been thoroughly staunched.

There are some other points of after-treatment

of hæmorrhage, particularly in examples of the purpuric type. But as such treatment is mainly constitutional in character, and calls for internal remedies, it belongs to the physician and need not be insisted on in an essay which relates exclusively to the art of tiding over danger in the operating room and from one particular class of operation.

SUMMARY.

In summary, the leading points I put forward are that hæmorrhage from tooth extraction is due to one of three sets of causes. (1) To purpuric or fluid blood of which there are two varieties; (*a*) the aqueous, (*b*) the saline. (2) The vascular weakness or paresis of artery, occurring in constitutions (*a*) strumous or scrofulous, (*b*) anæmic, (*c*) alcoholic, (*d*) syphilitic. (3) To mechanical lesion, the result of extensive mechanical injury.

In the treatment of hæmorrhage of the second and third classes styptic treatment with pressure is that most immediately useful, the best styptics being tannin, and perchloride of iron, either of which may be applied by means of the styptic gutta-percha disc. In the treatment of vascular hæmorrhage secondary or albuminoid coagulation must be induced for which the subdued actual cautery is necessary, In all cases alcoholic stimulation is inadvisable; and the fact of blood being swallowed need not afford cause for anxiety.

Discussion.

Mr. Thomas Arnold Rogers referred to the fact that he had on some occasions availed himself of Dr. Richardson's skill, and had done so with great advantage. He never extracted a tooth for any of the members of one family of hæmorrhagic tendency without first ascertaining that Dr. Richardson was in town.

The President remarked that he was surprised that Dr. Richardson had not mentioned, as a means of checking bleeding from the sockets of teeth, the replacing of the extracted tooth or teeth. He had also found dilute nitric acid to act as an excellent hæmostatic. In a case which he cited it had staunched bleeding which had persisted for thirty-six hours. The patient, it might be interesting to state, died ultimately from hæmorrhage from a wound in the mouth.

Mr. F. Newland-Pedley said in pronounced cases of hæmophilia the treatment he leaned to was to take the patient into a hospital, and give perchloride of iron with Epsom salts internally for a week. By this means he was under observation, and had no access to alcohol.

Mr. W. H. Coffin presumed that Mr. Newland-Pedley's observations were intended to enforce the importance of treating these patients at their own homes.

Mr. Storer Bennett remarked that from time to time there were unfortunate cases, in which elastic bands having escaped observation, the periosteum had become separated. The occasional use of such a band was one that might be adopted with great advantage for the purpose of loosening the teeth of bleeders. About four years ago they had in the hospital a young man of distinctly hæmorrhagic tendency with a tooth requiring removal. It was decided

that the best way was to put a band round the tooth and change it from day to day, forcing it further and further up the tooth, which was by this means removed. He had found that peroxide of hydrogen was a useful hæmostatic. From time to time it was necessary to inject it up sinuses, and if in inserting a probe slight hæmorrhage was caused the instant the peroxide was introduced, bubbles were given off and the hæmorrhage stopped. Having noticed this, he had used a 20 per cent. solution for arresting hæmorrhage, with the result that the blood was staunched immediately. About six months ago, however, when resorting to the same remedy, it did not act as a hæmostatic. But, although it did not always effect the purpose, it was nevertheless very useful, and it was desirable, if possible, to have three or four strings to one's bow.

Mr. R. H. Woodhouse felt sure that it would not be the wish of the Society to narrow down the discussion to the question of the means of arresting hæmorrhage. Dr. Richardson had mentioned the disappearance of scurvy, which was very prevalent forty or fifty years ago. Mr. Woodhouse was inclined to attribute the disappearance in a great measure to the co-incidental increase in fruit importation, which was so great that oranges and lemons, which formerly had a very limited season, could at the present time be purchased almost all the year round. He had himself seen one or two cases of aggravated scurvy successfully treated by a judicious and liberal system of diet, one case was that of a young midshipman on board ship, whose face and body were covered with patches, the teeth also being much affected and the gums swollen. Nearly every dental surgeon had his favourite method of arresting hæmorrhage. He used cotton wool steeped in styptic colloid, but not quite in the same way as Dr. Richardson; if it were pressed too forcibly into a cavity it was apt to give considerable pain; he used it with an anodyne, and believed carbolic acid to be the best. He considered that a great deal of the trouble which arose in endeavouring to arrest hæmorrhage was due to pressure;

he found very light pressure sufficient. The socket of each fang should be carefully filled with the saturated wool, not with one general plug, but built up of small pieces, after the manner of a gold filling. All plugs of wool should be removed after a few hours, otherwise considerable inflammation followed and became a cause of subsequent bleeding. Mr. Woodhouse then described a method of uniting ligatures from adjoining teeth over and crossing the plug or compress placed over the sockets from which the hæmorrhage was taking place. He further mentioned the simple method of retaining a plug by a soft wood strut wedged between adjoining teeth.

Mr. David Hepburn said Dr. Richardson had mainly referred to cases where a definite socket had to be dealt with, those were the simplest. Those which gave the most trouble were the instances in which practically no socked existed; *e.g.*, when a loose tooth had been taken from a flabby gum, and where the application of a strong remedy would simply create a new source of trouble. He was of opinion that the less the gum was irritated by strong applications the better. In those cases where pressure might be applied he had always found it desirable in the first instance to take an impression of the mouth before irritating the gum, then apply a splint, which should be a permanent one. With the present means of rapidly vulcanising, and packing upon a model, a splint could be turned out in one-and-a-quarter hours. In these cases he had found the greatest advantage arise from enveloping the gum with lint saturated with perchloride of iron, then applying the permanent splint and bandaging the jaw.

Mr. S. J. Hutchinson said that, in his judgment, there could be no doubt whatever that where there was a history of hæmorrhagic diathesis, treatment beforehand was very advisable, and in male patients ergot of rye might be used with advantage. Unfortunately the history in these cases was, nine times out of ten, learnt after instead of before the operation. Mr. Woodhouse's use of the silk ligature was a most admirable plan; he found it also very useful when the first piece of silk had been tied round the tooth to

thread it through a plug of amadou, so keeping this last in position. In employing Mr. Hepburn's excellent suggestion it was well to plug the sockets before taking the impression.

Dr. Richardson, in replying to the various speakers, said it had been the ambition of many men to hope that some of the things they had done should be remembered after their deaths, and to wish that they could hear the recognition. Well, he was not dead, but he experienced no small pleasure in hearing two of the speakers, Mr. Bennett and Mr. Woodhouse, expressing themselves favourably of styptic colloid and of peroxide of hydrogen, for both of these remedies were his own introductions into practice. Peroxide of hydrogen, discovered in 1818 by the distinguished Baron Thénard, remained a chemical curiosity, until he (Dr. Richardson), in 1858, began to use it medicinally, first in diabetes, then in pulmonary consumption, and afterwards as an external remedy as well as an internal. Styptic colloid he first made or invented, as well as introduced, and he had also originally made and used carbolic colloid, for many years, as a combined styptic and local anæsthetic. Mr. Bennett, in using peroxide of hydrogen as a styptic, had seen varying results because he had been using a different substance at different times. In order to keep the oxygen fixed in the peroxide solution some chemists add a small quantity of nitric acid, and then the solution is a styptic by virtue of the acid; but in itself the peroxide could not be called, strictly, styptic, although by the escape of the oxygen the blood, no doubt, is slightly thickened, a very curious fact not yet explained. The use of the extracted tooth as a plug had not been successful in his (the speaker's) experience, although he had often known of its having been used in the manner the President had mentioned. Referring to Mr. Newland-Pedley's observations, he would be only too happy to confirm, if it were possible, that gentleman's views as to the mode of preparing a patient suffering from the hæmorrhagic diathesis with fluid blood for an operation that should be free of danger. The administration of perchloride of iron in such

cases was an old practice and was a common practice, but there was no proof whatever that it had the practical effect of increasing the plasticity of the blood. Indeed, in one of the very cases to which attention had been drawn, the sufferer had been through a long medicinal course of this kind but without any protective result. The nature of the hæmorrhagic tendency was always a question of diagnosis, as to whether it depended upon fluidity of the blood or upon failure of the arterial control. Mr. Hutchinson had spoken of the value of ergot for suppressing hæmorrhage; here again it was a question of diagnosis. Ergot would have no effect for good, but rather the reverse, if the blood were abnormally fluid, while it might be of great service if the flow of blood were due to deficient arterial tone, for the action of ergot was not as a styptic, but as a substance which causes contraction of organic muscular fibre. Of the value of amadou Dr. Richardson could not speak in the same terms of commendation as Mr. Hutchinson. Amadou had a certain styptic effect, but in extreme cases, such as were referred to in the paper, it had been of little use in his (the speaker's) practice. He agreed with Mr. Hepburn in the method of making a mould for compression where there were no teeth on each side the bleeding point or where there was no efficient socket, and he thought that an immediate mould might easily be made out of the styptic percha which he had placed before the Society. In conclusion, Dr. Richardson thanked the members for the kind attention they had bestowed on his paper, and to Mr. Thomas A. Rogers especially for his most kind observations.

Votes of Thanks.

The usual vote of thanks having been duly carried, the President announced the Annual General Meeting of the Society would be held at 40, Leicester Square, on Monday, 12th January, 1891, at 8 p.m. Business : the Elections of Officers, &c. ; short Valedictory Address by the President. Casual Communications by Mr. S. J. Hutchinson "On Eruption of Permanent Lower Canines, at nine to ten years, and Mr. J. F. Colyer on "A Case of Lupus." Messrs. Robbins, Woodruff, Rilot and others, subjects not yet given.

Odontological Society of Great Britain.

ANNUAL GENERAL MEETING.

January 12*th*, 1891.

MR. FELIX WEISS, L.D.S.,

PRESIDENT, IN THE CHAIR.

THE Minutes of the preceding meeting having been read and confirmed,

Messrs. SYDNEY SPOKES and F. J. COLYER were appointed Scrutators of the ballot for the officers.

Mr. THOMAS MAUDSLEY HOWKINS, L.D.S., of Hull, was nominated for non-resident membership.

Mr. J. H. BADCOCK, M.R.C.S., L.D.S., was balloted for and elected a resident member of the Society.

The PRESIDENT then, in calling upon the officers for their reports, said that the Treasurer, Mr. Thomas Arnold Rogers, had prepared a most elaborate and carefully executed report, but was unfortunately prevented from tendering it in person.

The SECRETARY then read the Treasurer's Report, which was duly passed.

Odontological Society. Accounts for the Year—Nov. 1, 1889—Oct. 31, 1890.

Dr.	£	s.	d.
To Annual Subscriptions	400	1	6
,, Arrears	28	7	0
,, Entrance Fees	37	16	0
,, Sale of Transactions	6	2	10
	£472	7	4

Cr.		£	s.	d.	£	s.	d.
By Rent					150	0	0
,, Fire Insurance					22	10	6
,, Meetings.	Baker—Hire of Microscopes and Lamps..	2	4	0			
	Mr. Boyd-Wallis, Hon. Sec.—Sundries ..	1	0	1			
	Bale & Sons—Notices, Postage, &c., &c...	21	9	9			
	Camps—Refreshments	23	13	0			
	Hutchins—Carpenter	0	12	6			
	Slab for Reporters	0	18	0			
					49	17	4
,, Library.	Churchill—Books	6	4	10			
	Hersant—Binding	2	11	4			
	Rutterford—Books	0	12	0			
	Bale—Sundries	0	16	0			
	Camps—Sub. Librarian	5	5	0			
					15	9	2
,, Museum.	Mr. Storer Bennett—Curator, Sundries ..	8	5	0			
	Mr. H. Lloyd Williams—Sub. Curator ..	5	5	0			
	Curator's Assistant	7	0	0			
	Hutchins—Repairs	1	1	0			
	Sundries, per Camps	0	13	0			
					22	4	0
,, Transactions.	Bale and Sons	128	5	7			
	Past Presidents' Portraits	8	8	0			
	Mr. Bland Sutton—Illustrations to Paper	6	0	0			
	Mr. Mummery— ,, ,,	9	0	0			
	Dr. Dudley Buxton—Sub. Editor	28	0	6			
	Sundries	2	11	5½			
					182	5	6½
,, General.	Holmes—Members' Subscriptions Receipts Books	2	10	0			
	Bale—Treasurer's Account Book	0	17	6			
	Bale—Stationery, &c.	6	2	8			
	Bale—Sundries	1	6	11			
	Treasurer's Postage	3	10	0½			
	Camps—Gratuity	5	5	0			
	Sundries, per Camps	0	17	0			
	Bank Commissions	0	3	0			
					20	12	1½
					£442	18	8

	£	s.	d.
Balance, October 31st, 1889	204	11	10
Gross Receipts, November 1st, 1889, to October 31st, 1890	472	7	4
	£676	19	2

	£	s.	d.
Gross Expenses, November 1st, 1889, to October 31st, 1890	442	18	8
Purchase of £121 13s. 8d. Consols, 2¾% @ 97⅛	118	7	4
Balance in hand, October 31st, 1890	115	13	2
	£676	19	2

	£	s.	d.
Gross Receipts for the year, November 1st, 1889, to October 31st, 1890	472	7	4
Gross Expenditure	442	18	8
Surplus of Receipts over Expenditure	£29	8	8

INVESTMENT ACCOUNT.

	£	s.	d.
Amount in Consols 2¾%, October 31st, 1889	2,878	6	4
Invested December 5th, 1889, £118 7s. 4d., @ 97⅛, producing ..	121	13	8
Dividends, January, April, July and October, 1890, £80 8s. 9d., producing	82	15	8
Amount in Consols on October 31st, 1890	£3,082	15	8

EXAMINED AND FOUND CORRECT, DECEMBER 10TH, 1890. { CORNELIUS ROBBINS. G. DENNIS CURNOCK.

The Librarian (Mr. Ashley Gibbings) read his report:—

"I am glad to be able to report that the Library is in a satisfactory condition, and during the year several books of great interest have been added to it. The number of members and students who avail themselves of the privilege of borrowing books is still not so great as I should have expected, and I must again earnestly request those who do so to return the books which they borrow as soon as they have finished with them, that others may have the opportunity of reading them. The book-cases are now quite full, and during the ensuing year I hope that an additional case may be supplied for the books which I am sure some of our generously-disposed members will present to the Society.

"Since our last meeting we have added to the Library:—Dr. Miller's 'Micro-organisms of the Human Mouth,' Fletcher's 'Metallurgy' and Dr. Talbot's 'Irregularities'; and I have also to acknowledge, with thanks, from Messrs. Ash and Sons' Dr. Blodgett's 'Dental Pathology' and Dr. Fillebrown's 'Operative Dentistry.'"

The Curator (Mr. Storer Bennett) said that as he had taken the opportunity at each monthly meeting during the year of exhibiting and describing the specimens which had been received between the meetings, there was little to add in the annual report. He had followed the good precedent set by the Curator of the Royal College of Surgeons of England, who habitually exhibited at the Annual General Meeting of the College all the specimens that had been acquired during the twelve months. Mr. Storer Bennett had therefore placed the specimens received during the year upon the tables where the members could inspect them. Although the donations were less numerous than in some preceding years, they were yet of considerable value and interest. He had had the pleasure to offer a 10 feet case to the Museum, which the Council had accepted, and he had nearly filled it with specimens illustrating comparative dental pathology. He thought that being collected together, instead of scattered throughout the Museum as formerly, would render them more convenient

for reference. He hoped that before long this series would be more complete than at present.

On behalf of the Council of the Society, the President proposed that Bye-laws II. and V. should be amended.

The following alterations were accordingly put to the meeting and unanimously carried.

That in Bye-law II.

Clause 1. Resident Members shall consist of gentlemen residing in London, or within ten miles of the General Post Office, St. Martins-le-Grand.

Shall read—

1. Resident Members shall consist of gentlemen residing or practising wholly or partly in London, or within ten miles of the General Post Office, St. Martins-le-Grand.

Clause 2. Non-Resident Members shall consist of gentlemen residing beyond ten miles from London.

Shall read—

2. Non-resident Members shall consist of gentlemen wholly practising beyond ten miles from the General Post Office, St. Martins-le-Grand.

Bye-law V. Recommendations for Resident Members shall be signed by two Members from personal knowledge, and by two or more from general knowledge. Recommendations for Non-resident Members may be signed by one Member only from personal knowledge, and by two or more from general knowledge.

Shall read—

V. Candidates for Resident Membership shall be recommended by four or more Members, two at least signing from personal knowledge. Candidates for Non-resident Membership shall be recommended by three Members, one at least signing from personal knowledge.

Mr. Browne-Mason (Exeter) described a case of unilateral absorption due to pressure. He said some ten years ago he made the patient upper and lower dentures, the superior maxillary bone being then edentulous, whilst the lower jaw was pretty much in the same condition as at present. The patient, however, to use her own words, "would not take the trouble to wear the lower plate, as she did not feel the need of it; even if it did not hurt her it was an encumbrance." The result was the bearing being only on the left side; it caused absorption of the alveolar

ridge, until it was reduced, as seen in the model, an ink line indicating the free margin of the remains of the process, on its outer edge the ridge being, at the back of the mouth, pressed quite half an inch inwards, and very much reduced in height, as shown by the bite. The strange part of the case was that the patient was quite content, and appeared to get on very well with the denture made when she first consulted Mr. Browne-Mason, notwithstanding that, as the ridge gradually disappeared on the left side, the plate was so tilted that it positively stood away a very considerable distance from the alveolar ridge on the side of the mouth in which there were no opposing teeth. He remarked it was strange that patients would tolerate such a condition, when there is the greatest difficulty in inducing them to wear the most carefully and well-thought-out plates for their comfort. The patient had only lately come back, because her friends complained of the slope which the upper front teeth had taken, and in making a fresh plate Mr. Browne-Mason had to place the left molars outside the ridge that remained, there being a good bony foundation, as shown in the model, for the plate to rest on. He also exhibited three salivary calculi of unusual size, which formed in the sublingual gland of a gentleman. The patient when on a visit abroad was taken ill, and a very alarming abscess formed under the tongue. On this bursting, these stones came away from the gland. Their weight in the dry state was 4, 5, and $5\frac{1}{2}$ grains respectively.

In answer to a question from Mr. Woodhouse, Mr. Browne-Mason stated that he was unable to say definitely whether these calculi had formed in the duct or the glands, but the medical man in attendance had stated that the latter was the case.

Mr. C. Robbins brought before the Society the following cases of interest. The three sets of models shown were from a family in which half of the members showed a peculiar deviation from the normal type, and served to illustrate some of the remarks of the President in his

Inaugural Address in reference to marked family peculiarities in the size and form of the teeth. The other members of the family had entirely escaped this condition. Both parents having died a long while ago, it was impossible to obtain information about their teeth, but some cousins were known to have a somewhat similar condition. Mr. Robbins contended that the condition was probably hereditary. The sisters from whom these models had been taken varied in age from about seventeen to twenty-five, and the most marked case was the youngest. In one model it would be observed that the cuspidated condition was so exaggerated that the canine had really become bicuspid. The drawn-out look of the bicuspids and the multiple cusps of the molars were remarkable, there being distinctly twelve small cusps on a molar in the lower jaw.

In Case 2 the models presented a somewhat unusual appearance. The patient, Miss M., aged about nineteen, was brought to Mr. Robbins some time ago with the following condition: the absence of permanent central, lateral, and canine teeth on the left side, the jaw being in consequence feebly developed about this region. On the right side the temporary canine still persisted, and portions of the temporary roots were helping to keep the bicuspids from their normal position. This remark did not apply to the first bicuspid of the left side, as there seemed no cause for its coming in such an oblique, almost horizontal, position, so that Mr. Robbins mistook it at first for the non-erupted canine. This family was also noted for its abnormalities in dental matters. One sister had an upper temporary canine persistent, with the permanent canine taking the place of the non-erupted lateral. The brother was deficient in some of his bicuspids, and had the inferior canines pointing almost horizontally towards the tongue. The treatment adopted was simple enough. An effort was made to regulate the bicuspids into their proper position, after the extraction of the temporary canine and the roots. The patient would not bear the regulation frame, Mr. Robbins therefore made a simple vulcanite case to fill up vacancies. The patient's mother seemed to attach some importance to

the fact that at the age of two and a half years the child had a severe fall, breaking off some of the temporary teeth. Although the patient looked well developed, she had never been strong, and had always evinced a desire to be biting something, when not actually eating, similar to that of a child during the first dentition.

The third case was that of Miss M., aged about twenty-six, who met with a tricycle accident, and as one of the results fractured the upper right central and lateral. The upper teeth were of the spreading-out sort, and the lower lip was lacerated by them in the fall. About a quarter of each tooth was broken off obliquely, yet, strange to say, the pulp was not exposed, or even much irritated. The patient came to Mr. Robbins principally on account of the sharp edges of the broken teeth irritating the swollen lower lip. He advised excision of the crowns, and the fitting of two pivot teeth. The patient desired that he should carefully examine the hard swelling of the lower lip, and after doing so the suspicion was confirmed that there was a portion of the tooth in the lip. The patient was advised to consult her medical man again, with a view to having the fragment removed from the lip. This was attempted without success. About this time she left the country for a while. Six months ago the patient came again, and reported that eventually (about three months from the time of the accident) the fractured portion of the central came through the front of the lower lip, about half an inch below the spot at which it had been supposed to have entered.

The fourth case closely resembled the case just mentioned. It illustrated how nature will sometimes tolerate even sharp and most unlikely foreign substances in the movable tissues without much inconvenience to the patient. At the age of three a boy was playing in the drawing-room. His mother was on the lawn, and called him. He, being ignorant of the nature of French windows, made a rush through the window, breaking the glass and cutting himself badly. The mother stopped the bleeding until the old family doctor arrived. No attempt was made to probe for pieces of glass, and in course of time the cuts healed up, and

although the boy always declared that he had two pieces of glass in his cheek, no one believed him. They gave him very little inconvenience, but at the end of thirty-three years he felt a sharp point inside his cheek, scratching his gum, and in the course of the day he managed to wriggle it out. The piece of glass measured seven-eighths of an inch in length by a quarter of an inch at its widest part. This specimen, with the models, were presented to the museum. The patient was present, and many members examined his cheek, where another piece of glass could easily be felt.

The PRESIDENT said that the last case illustrated very forcibly how long foreign bodies might remain in the living tissues without any serious results. The case was quite unique.

Mr. C. S. TOMES remarked that very great interest attached to the models exhibited by Mr. Robbins, because of the light which they threw on the genesis of cusps. The bicuspids were all stunted in point of size, but the stunting was not merely in size, for it had fallen mainly upon the inner or latest acquired cusp, whilst the outer or original cusp, corresponding with the one cusp of the canine, was of full size. The bicuspids, in fact, consisted of an outer cusp, to the inner side of which was a cingulum, hardly elevated into a cusp at all, so that the teeth demonstrated very prettily the relationship of canines and bicuspids. It was to be regretted from a morphological point of view that the molar had not undergone a similar stunting, though one of them did show in an almost diagrammatic manner which was the primary cusp, homologous with the cusp of the canine, and therefore which were the superadded cusps, though no light was thrown upon the order in which they were added.

Mr. WOODRUFF showed the models of a patient's mouth, aged thirty-five, in which, whilst all the teeth on the left side articulated perfectly, those on the right side from the bicuspid backwards did not meet, the space between the upper and lower jaw when the mouth was closed being fully an eighth of an inch. One bicuspid of the upper set

on either side and the lower wisdom teeth were missing, but beyond this both the teeth and the jaw were well developed, and there was no history of mechanical treatment having been attempted nor of accident nor cicatrix to account for the abnormality. Mr. Woodruff thought it might be interesting to the members of the Society, and although he could offer no explanation himself, would be glad if any member present could throw any light on the matter or suggest a cause.

Mr. Rilot read a Casual Communication.

The first case was a model of what, for want of a better description, might be called an abnormal tooth. It was brought to his notice as a case of gemination of permanent incisors, but on examination this view became hardly feasible, on account of the size of the specimen. It must, then, be either retained geminated temporary incisors, or an abnormal double-crowned lower incisor. If it had been temporary, the two teeth were unusually large, while such a thing as a double-crowned incisor was, as far as was known, an unheard-of abnormality. Taking, therefore, what hypothesis one might, there were elements of uncertainty. It might be added that the neck was very constricted, and it could not be determined whether there was any bifurcation of the root. The patient's age was about thirty: and he could give no information as to the time of its eruption. It was very firm, and there was no sign of any other tooth.

The second case was one of intense facial neuralgia, relieved by a very slight operation. On the 16th of last November, Mr. Rilot was asked by the house-surgeon of the North-West London Hospital to see a case of neuralgia in the wards under the care of Mr. Frederick Durham. On seeing the patient it was at once evident that she was suffering intense agony; the well-known outward and visible signs of neuralgia were present in the tense, shiny skin, and heightened colour of one side of the face. Every time she opened her mouth to talk, or take food, the pain came on in great intensity. According to the patient's description it began in the right upper jaw, and thence radiated to the whole of that side of the face. It appeared from the previous

history of the case that the trouble came on about six months previously; the patient was then seen by Mr. Mayo Collier, who prescribed Ammonium Chloride and Tr. of Gelseminum, which quickly relieved her. When the trouble returned the second time the same prescription was tried, but without the least effect. Mr. Rilot was then asked to see her, as Mr. Durham thought there might be some buried roots, and she said she felt something there which, on being touched, started the pain. When he came to examine her he found that the least touch, even with a silver probe, brought on a paroxysm of pain. He therefore had her put under chloroform, and made a thorough examination of the jaw. The sockets of some teeth which had been removed some time previously had not thoroughly healed up, but there was neither bare bone nor buried root. A little piece of bone (probably the piece the patient felt) which was resting on the surface attached to the gum, was removed. She was sent back to Mr. Durham, saying that no local cause was discoverable. The interesting part of the case was, from that moment the patient experienced absolute relief, and after being kept in a week to see if there were any recurrence, she was discharged well. Whether the cure will be a permanent one remains to be seen. But, at all events, the fact remained that absolute relief was afforded, either by the probing, the removal of that tiny piece of bone, or the chloroform.

Mr. H. Baldwin wished to mention, in connection with Mr. Rilot's case, one which he saw some time ago. The patient, a healthy young man, had had a tooth extracted some long time previously—a molar in the upper jaw. The socket healed up, but when he came to Mr. Baldwin he was suffering intense pain, which he referred to this point. Mr. Baldwin probed this depression with a sharp probe, and advised the patient to allow him to make an incision across the depression. This was done, and the patient wrote and told him that he had had absolutely no pain since.

In reply to Mr. H. Lloyd Williams, Mr. Rilot said that roughly speaking, the piece of bone removed was situated in the position the first molar had previously occupied.

The PRESIDENT then delivered his valedictory address :—

VALEDICTORY ADDRESS.

IN assessing the social and the scientific condition of a people no better test can be applied—at the present day, at least—than that furnished by a study of its literature. I can hardly imagine the advancement of any profession without a corresponding advancement in its written records ; and it is always a profitable enquiry to mark the progress made in those branches of science that admit of being illustrated by published records.

It is not my intention, in a short valedictory address like the present, to do more than glance at the literature which has enriched our own profession, and we are at once met by the startling fact that our very existence as a scientific body hardly marks more than 100 years. Every medical catalogue sufficiently demonstrates the wonderful changes that distinguished the discoveries made in medicine and the improvements in surgery while passing from the seventeenth to the eighteenth century, and more conspicuously the progress that characterised the opening years of the present century. It is not desirable that we should now trace this progress, although the study is a fascinating one. We may observe that it was not until the second half of the eighteenth century any treatise on the teeth meriting record appeared. In 1771 John Hunter's "Natural History of the Teeth," and the same author's work on "Diseases of the Teeth," was given to the profession in 1778 ; but, strange to say, the century ended without any essay in extension of these researches. A great change now, however, showed itself,

and the medical and the dental world seemed suddenly to awake to the importance of our branch of medical science. In dental matters, before the nineteenth century was half exhausted, no less than fifty works were published in the English language alone, and the familiar names of Fox, Bell, Saunders, Nasmyth, Tomes, and others merit our recognition and their labours demand our heartfelt thanks. The second half of this century is so near our own time that it would be invidious to do more than acknowledge the steady progress that has characterised our subsequent efforts. I might, however, be allowed to refer to John Tomes' "System of Dental Surgery," first published in 1856, and to express my conviction that this work did more to advance the general knowledge of our art than any treatise previously given, and that its subsequent editions in conjunction with his son, Mr. Charles S. Tomes, have conferred a lasting benefit on the present generation.

I must not, however, conclude these hurried remarks without alluding to the periodical literature of this period, and perhaps I may be allowed to refer with pardonable pride to the forty years of journalistic work I have more or less had something to do with. I remember the first number of the *Forceps* being published, and I must say that with all its faults (and it had many) it led the way to further literary progress, and gave the opportunity for thoughtful men to express their views and to try and advance the status of our profession. It is well known to many that I have always advocated anonymous authorship, and I still hold that reforms of most kinds would never have been effected if the names of the proposers had always appeared. For as Sir Walter Scott has said, "We do that in our zeal

our calmer moments would be afraid to answer." In dental matters the angry discussions of a past period have only made the sunshine of our present advancement the more brilliant, and I can hardly point to a single year when advancement was not effected by those who perhaps—naught suspected—anonymously laboured for the general good.

As a scientific body the Transactions of this Society will ever hold a conspicuous place in our literature, and I venture to believe that its records from 1857 to the present year will contrast favourably with the records of other medical societies, and that our profession has no occasion to be ashamed either of its industry or its progress. That the Transactions of the session which nominally ends this evening have not been behind former years either in interest or importance, I think you will willingly admit; and I see around gentlemen whose training warrants me in believing that the advantages afforded by hospital practice and the improvements which spring from improved modes of procedure in everyday work will continue to enrich our records, and make the Transactions of the Odontological Society even more worthy of our acceptance and better calculated to raise the status of our profession.

For myself, I have but thanks to offer to all those who have so faithfully supported me. Officers and members alike have tried to make these last days of my professional life happy ones, and although my words are but few, believe me they are heartfelt and sincere.

The result of the ballot being declared the following members were elected as officers and councillors for the year 1891 :—

PRESIDENT.

S. J. Hutchinson.

VICE-PRESIDENTS.

Resident : J. Stocken, David Hepburn and T. H. G. Harding.

Non-Resident : W. Bowman Macleod (Edinburgh), J. H. Redman (Brighton) and R. T. Stack (Dublin).

TREASURER.

Thomas Arnold Rogers.

LIBRARIAN.

Ashley Gibbings.

CURATOR.

Storer Bennett.

EDITOR OF THE TRANSACTIONS.

Walter Coffin.

HONORARY SECRETARIES.

J. Ackery (*Council*), W. A. Maggs (*Society*) and F. Henri Weiss (*Foreign Correspondence*).

COUNCILLORS.

Resident : C. S. Tomes F.R.S., Willoughby Weiss, W. H. Woodruff, W. Hern, F. Newland-Pedley, C. J. Boyd Wallis, F. J. Bennett, Cornelius Robbins and E. G. Betts.

Non-Resident : M. de C. Dickinson (St. Leonards-on-Sea), A. A. de Lessert (Aberdeen), Alex. Fothergill (Darlington), W. B. Bacon (Tunbridge Wells), H. B. Mason (Exeter), Mordaunt A. de C. B. Stevens (Paris), T. S. Carter (Leeds), Edmund Binns (Middlesbro'), W. S. Woodburn (Glasgow).

Votes of Thanks to the Retiring Officers.

Mr. T. Charters White proposed the vote of thanks to the President, and in doing so spoke of the affectionate regard in which he was held by all who knew him.

The President briefly responded.

Mr. Morton Smale proposed, and Dr. Joseph Walker seconded, the vote of thanks to the officers, which was acknowledged by Mr. Ackery.

The next meeting of the Society will be held at its rooms, 40, Leicester Square, on Monday, Feb. 2nd, at 8 p.m. Business: Paper by Dr. Silk, "Clinical Observations on Bromide of Ethyl as an Anæsthetic in Dental Surgery, with Recorded Cases;" casual communications by Mr. Sewill on "The Etiology of Empyema of the Antrum;" Mr. T. Charters White on "A new Method of Demonstrating Dental and Osseous Tissues in Microscopical Specimens;" Mr. Storer Bennett on "A Case of Alveolar Abscess of Three Years' Duration, due to Perforation of the Side of a Root;" Mr. Ackery on "Some Cases of Eruption of Teeth in Abnormal Positions;" short introductory address by the President.

Odontological Society of Great Britain.

ORDINARY MONTHLY MEETING.

February 2nd, 1891.

Mr. S. J. HUTCHINSON, M.R.C.S., L.D.S.,

President, in the Chair.

The Minutes of the preceding meeting having been read,

The Treasurer (Mr. Thomas Arnold Rogers) drew attention to a printer's error in the Treasurer's report, which appeared in No. 3 of the *Transactions* on page 76, wherein the item Fire Insurance was erroneously stated to be £22 10s. 6d., instead of £2 10s. 6d., the correct sum.

The Minutes thus amended were confirmed.

Messrs. H. L. Albert, M.R.C.S., L.D.S., and Theodore W. Harris, L.D.S., were elected resident Members, and A. W. W. Baker, M.D.Dub., F.R.C.S.I. and L.D.S.I., was elected a non-resident Member.

The nominations of Messrs. Vernon Knowles, L.D.S.I., London Road, Reading; C. A. Clarke, L.D.S., Vega House, 7, London Road, Forest Hill, S.E.; S. A. Coxon, L.D.S.I., 4, York Road, Wisbech, for Membership of the Society, were read.

The Librarian's Report was read. It stated the following works had been received:—Vols. 3 and 4 of "North Ameri-

can Fauna," issued by the United States Department of Agriculture. No. 1, Vol. XXII. *The Dental Advertiser* (Buffalo, U.S.A.). *Transactions of the Illinois State Dental Society* (2 vols.). *Comptes Rendus du Premier Congrès Dentaire International*, tenu a Paris, 1889 (per favour of Professor Dubois).

The Curator (Mr. Storer Bennett) reported the receipt of one donation to the Museum, viz., that of an upper model from Mr. Morton Smale, showing a miniature supernumerary tooth on each side of the mouth, on the buccal aspect of the molar series.

The President said he had searched the *Transactions* of the Society for precedents as to when the Inaugural Address should be delivered, and he had found that on some occasions it was given before, and on some at the conclusion of the meeting; but he thought from the very nature of the address it should be taken rather at the first part of the meeting; he accordingly should, on the present occasion, deliver his address before the reading of other communications.

PRESIDENT'S INAUGURAL ADDRESS.

GENTLEMEN,—I stand before you this evening with very mingled feelings—of pride and of fear! I am only mortal, therefore the first sentiment is excusable, and, I venture to say, justifiable, for it would be but a poor compliment to you, and to the members of this Society, whose suffrages have placed me in this exalted position, if I did not express in the fullest way my heartiest thanks for the honour you have done me in electing me your Thirty-first President.

It has been quaintly said that "Vanity is merely respect for the good opinion of others," and Narcissus himself was not more vain than I, if my vanity is to be measured by the respect I have for your good opinion!

I spoke also of fear, and that, perhaps, is almost as strongly developed as the other amiable virtue. Fear may be defined—though, perhaps, not in the dictionaries—as "a strong desire to be in two places at once." You will see the appropriateness of the definition. One place, of course, is this honourable chair; the other—anywhere else! At this moment, when I speak of fear, it is as a noun of multitude; fear lest I may not be able to give an address worthy of the occasion; fear lest this session may be deficient in mental pabulum; fear lest you have over-estimated my capabilities to worthily fill the position which it has been one of the ambitions of my life to occupy. And now that it is attained, I feel the responsibility of maintaining the prestige of this Society is a very heavy one. Fortunately, however, this responsibility is shared by the Council, and

by the Society itself; and, with the strong Council and the energetic Secretaries, I can only hope that we may have a very interesting and instructive series of meetings.

It is here, at least, fitting to allude to the fact that the Annual Meeting of the British Dental Association will be held in London this year, and we shall have the privilege of welcoming our *confrères* from all parts of the kingdom.

The Metropolitan Branch of the British Dental Association has also been established, and we look with pride upon the new-born offshoot of the Dental Societies with the hope that its career may be prosperous, as it cannot fail to be if it follows the traditions of its parent and grandparent, and provided the strong leaven of *fin de siècle* is not allowed to predominate.

There is ample field for this new branch to discuss dental politics and ethics and new methods of practice, but I should be failing in my stern duty as your President if I did not express the hope that members of the Society, who are also members of the Metropolitan Branch, will present their scientific and other work before this Society.

Gentlemen, we do not want this Society to be the Odontological Society of London, but of Great Britain, and I trust we may have papers and casual communications from all parts of the kingdom as well as from London. It must always be a fact that this Society has the distinction of a *genius loci*, and its Library and Museum are the storehouses of the results of progress and contain the stepping-stones over which the science of dentistry advances, and while the Society attracts the picked men all over the country, it radiates the effect of their good work in equal proportion.

Donations to our Museum are always acceptable, and it is of the utmost importance that this museum should maintain its high standard of efficiency; and the marvellous display in Dublin in 1888 shows the store of valuable specimens in the hands of members of our Societies, and I trust the day is not far distant when all these specimens will find their way into our Museum. I should then be prepared to advocate the transportation of selected duplicate specimens on loan to every city or town where the British Dental Association may hold its Annual Meeting, so that in the first place a selection should be made by the Curator, and secondly, that any donor should have the right of requesting his specimens to be lent to the annual meeting of the British Dental Association.

It is certain, of course, that a certain risk is run of breakage and loss, but I think a special case might be designed which would carry the specimens with safety, and with efficient organisation there is no reason why we should not follow the example of those gracious people who lend their pictures and other interesting valuables to Exhibitions all over the kingdom. Then we have our library; it is a very good one, but I do not think it is quite perfect—I should like our library to possess every single work on dental matters produced throughout the civilised world in an orthodox manner, and I trust our Council will be able to adopt this policy through its librarian.

The advantage of specialism in scientific work is a point which is hotly debated, but whilst one could enlarge upon this topic, I must content myself with another definition of what specialism may be taken to mean. It surely means that it is the result attained by a liberal education

being brought to bear upon the experience gained by constant practice of some department of study for which the individual has a natural or acquired aptitude.

To put it in another way, when a man has gone through a course of general study, he finds probably that the bent of his inclination leads him to pay more attention to one subject than the others, and it is obvious that if he works at this subject steadily—collects evidence of what has already been done—takes every opportunity of repeating these experiences, and of dealing with the matter in his own way, surely the aggregation of these data must result in his being able to deal with, and, if necessary, to treat cases which fall within the scope of his training.

All this, no doubt, is very trite, but depend upon it that as time goes on and as civilization increases, specialism will cease to be a term of reproach and become the ambition of many earnest students in all branches of science. Surely the paths of literature may be taken as an illustration, when we find historians, poets, dramatists, novelists and journalists, usually sharply enough defined, and successful most when devoting their energies to one or other of these subjects entirely.

Darwin said: "It seems to me that an hypothesis is developed into a theory solely by explaining an ample lot of facts!" Gentlemen, may we not add to this—that theories become facts by the accumulation of instances in which theories are verified by their constant repetition in exact analogy,—and is not specialism the natural sequence?

Genius has been defined as the art of doing one thing superlatively well, and I think success may be defined as

the art of doing everything rather better than is actually requisite!

Depend upon it success in life, whether socially or in the exercise of one's daily duties, can never be secured in full, if one only does just enough

"To earn a night's repose."

The measure must be "pressed down and running over!"

It is interesting to look back to the last year or two to mark the progress which has taken place in our calling, and to note especially in its literature the new books and new editions which show the activity and energy ungrudgingly thrown into their labour by those who are endowed with the enviable gift of literary skill.

Then again, much good work has been done in the practical work, and it is remarkable that these efforts have been chiefly directed to the alleviation of pain in dental operations, and there is no field in medical or surgical practice more worthy of cultivation than the humane practice of our art.

We have fruitful and instructive discussions on anæsthetics, the introduction of gas and oxygen as a safe means of prolonged administration—further results in the successful use of bromide of ethyl. Then again, cocaine has been found by many to be capable of successful use as a local anæsthetic, though the record of some difficulties, make one reflect if it is as useful as nitrous oxide.

We have also had the record of experiments in hypnotism successfully tried for painless extraction of teeth, but I only mention this in order to offer an expression of my personal conviction that it is a method which should be employed—

if employed at all—under the most stringent conditions, and with the greatest care. In fact I would almost go so far as to say that I do not consider that it is a legitimate means of securing immunity from pain, as it is inapplicable to a normally healthy subject.

I would endorse most emphatically the resolution passed by the Psychological Section of the British Medical Association in Birmingham last year, condemning the use of hypnotism as a mere amusement, and calling for a committee of enquiry into its true nature.

I witnessed in Birmingham some very interesting and convincing experiments as to the possibility of reducing patients to the hypnotic condition, but the impressions they conveyed were those of humiliation, and extreme pity for the debased condition of the subjects whilst in the hypnotic sleep. The conclusion I arrived at, after very careful observation, was that the mesmeric power could only be exercised by individuals upon a really small percentage of patients, and therefore this could not be available for all operators and all patients, so that the exceptional cases capable of this effect being produced, would not really be of any universal service, besides which one could not but ask the question, as to what will be the future condition of the patients, who thus allow their mental state to be abrogated at the power of a stronger will.

I do not for one moment deny the potentiality of hypnotism, but I maintain most earnestly that whilst its effects may possibly be salutary in a few isolated cases, I consider that the state should only be produced in the presence, and with the full sanction, of a medical man, as well as that of the patient.

But still more strongly do I doubt the justifiability of hypnotism being exercised for the purposes of the operations in dental surgery, so long as we maintain the present average of success in the use of nitrous oxide "gas."

The influence of the latter is purely toxic, whereas hypnotism calls into play both mental and moral phenomena, which are degrading to the patient and dangerous to the operator.

In taking this emphatically antagonistic stand, I trust I shall receive the support and countenance of my fellow members of the Odontological Society of Great Britain.

Before discussing the subject of local and general anæsthetics, I should like to emphasize again my faith in nitrous oxide, believing as I do that when pure, and administered skilfully, we are using the very safest and most legitimate means of mercifully sparing our patients the shock of painful operations, and with ether of course its effects are prolonged.

For the most serious and prolonged dental operations we have an auxiliary in chloroform, which we could not do without; but it must be looked upon as a *dernier ressort.*

It is only right to mention that efforts are now being made to revive the use of Faradic electricity in securing painless extraction of teeth, but the experiments at present are in too crude a state to admit of their recognition. In the former use of this agent, the electric current was passed entirely through the forceps to the teeth, whereas the more recent method requires that the patient shall hold the terminals of the battery in each hand, whilst a third wire, attached to the handle of the forceps, diverts a portion only of the current through the tooth to be extracted, the

circuit only being completed at the moment of extraction.

With the great activity manifested on all sides in the development of electric lighting, it is only natural that dental practitioners should eagerly avail themselves where possible of this beautiful and healthful light, but so far the practical application of a mouth lamp is surrounded by difficulty.

It is essential to keep the light out of the eyes, both of patient and of operator, whilst at the same time the contrast between the light thrown into the mouth and that thrown on the instrument cabinet shall not be too great, for the sudden transitions from brilliant light to semi-darkness are much too trying to vision; therefore, it is essential to strive for the double illumination. I have ventured to bring this evening a mouth-lamp which, in my own experience, has proved fairly successful, and I have much pleasure in showing it, in the hope that it may lead to further improvements in this very desirable direction.

Having so far glanced briefly at the modern literature of our subject during the last year or two, and at the means for alleviating suffering, let us now glance at the enormous strides which have been made in the use of the roots of teeth for carrying artificial substitutes. A more scientific knowledge of the power of antiseptic agents has rendered it possible to make healthy the roots of teeth which a few years ago would have been condemned as useless, but I should like to call attention to a book by M. de Chemant, dated 1816, which contains an illustration of an appliance carrying ten artificial teeth on a narrow plate, adapted and fixed by four pins fastened in the roots of four teeth.

Truly there is nothing new under the sun!

It is cheering indeed to watch the efforts which are being made to produce fillings and inlays for incisors which shall imitate the natural colour and consistence of the natural teeth, rather than disfiguring them by elaborate and extensive displays of gold; and the inlays of ivory, of porcelain, and of glass seem to indicate that in the near future we shall have a most natural, lasting, and artistic means of treating extensive caries in incisors, canines and bicuspids.

Mention has been made of the progress of antiseptic dental surgery, and it is not necessary to dilate upon the details of the various agents which may be used in carrying out this most desirable method of practice, as so much has been written to such good purpose on this subject.

I would, however, ask the members of this Society to give their attention to the use of oxygen gas in the treatment of septic roots and of alveolar abscess, as I have made a few experiments which seem to indicate that we have in oxygen gas a therapeutic agent of the greatest value as an oxydising agent. I find it is possible to use the compressed oxygen now so easily obtainable, by fixing a small india-rubber tube to a small expansible net-covered bag at the outlet of the gas bottle, and slipping the india-rubber tube on to the nozzle of the injection needle of a hypodermic syringe. In this way it is possible to use pure oxygen in a variety of ways in the treatment of roots and abscesses, but my experience so far has been small, and I trust the idea may be carried out experimentally by those to whom the suggestion may commend itself.

Our Society very justly taboos political discussion and controversial matter, but it would not be fulfilling the

object of its initiation if we failed to be interested in dental education.

The recent alterations in the curriculum afford much scope for reflection, and a quotation from the first introductory address ever given before the Society makes us ask ourselves whether its aspirations have been realised.

The late Mr. Cartwright, in 1856, said:—"It cannot be doubted that a liberal education is of the greatest value to those engaged in practice; and the more education is extended in all ranks of society the more it becomes necessary that the members of our profession qualify themselves as highly as they can; for those who employ the services of the dentists in these days have a right to look, and do look, to the qualifications of the mind, as well as to the mechanical adroitness of the fingers."

Then again Mr. Cartwright said of the dental diploma: "A recognised connection with the College of Surgeons is best calculated to raise the status of the dentist to an equality with other medical practitioners, and rescue our profession from the anomalous position it has hitherto held. It is my opinion," said he, "that any attempt to separate dental surgery from the profession of surgery is impolitic in the extreme.

"By allying ourselves to the parent institution, the College of Surgeons, we must hold a proper position as professional men, while our status, I think, could not but be lowered by any scheme which involves a voluntary separation from that body."

Now, gentlemen, we must admit that Mr. Cartwright's views expressing, as they did, the opinions of those who gained for us the charter granting the L.D.S. diploma, have

in great measure been more than realised, and it is in our hands to maintain the prestige of that diploma, and by constantly raising the standard of the curriculum and examination, in harmony with medical education, we shall best be carrying out and emphasising the policy laid down for us in those early days.

I find amongst the names on the Council of the Odontological Society in 1856 those of John Tomes, Edwin Saunders, Thomas Arnold Rogers, Samuel Cartwright, G. A. Ibbetson and Henry Barrett, and we cannot but feel our hearts beat in unison with theirs in the exaltation they must feel in the proud realisation of their well-won victory, the L.D.S. diploma.

As to what must be our future course, and what we must do to enhance the value of our inheritance, I do not venture to propose on this occasion; I can only earnestly and sincerely as President of this Society offer to these gentlemen and others who worked with them, an expression of our gratitude and appreciation.

Glancing over the records of this Society, and of the scientific and literary work done by its members, we have just reason to be proud, and we have a stimulus given us to carry on the good work, and I am not one of those who consider that the "Caucasian is played out," as far as the scientific aspect of our profession is concerned. There are many problems yet to be solved, and I look to the army of highly-educated and accomplished junior members to do much good work, not only with the microscope, but in the accumulation of facts in anatomy, physiology, surgery and pathology, metallurgy, and mechanics.

There is ample scope for further research in regard to the

direct and remote influence of nerve-irritation and nerve-sympathy caused by dental lesions, especially during the eruption of the deciduous teeth and the third molars, such as the prevalence of grave mental and physical morbid phenomena such as convulsions, epilepsy, hystero-epilepsy, and other disturbances. There is also much unknown with regard to the prevalence of caries during adolescence, its causes and treatment; then again, the prophylaxis of caries is still far from being a scientific certainty.

We do not know much about the physiology of nerve sensation in tooth substance, and we can at present only theorise as to the zone of pain at the point where the dentine joins the enamel. We are profoundly ignorant as to the true function of the soft fibrils in dentine, and we cannot state with certainty whether any change or none, either of deposition or alteration, takes place in dentine after the complete formation of the tooth.

We are obliged to say that we do not know the exact *modus operandi* of such an apparently simple matter as the growth and eruption of a tooth.

There is a fruitful field for observation in the possible relation of skin diseases with dental caries, and the influence of dental disease on strumous glands wants working out.

We are still inventing fresh explanations, without explaining the true etiology of erosion, and when we say that the soft fibril of Tomes is a mass of protoplasm, possessing all the attributes of that organism in other parts of the body, we are only confessing the utterness of our impotence.

Turning to our practical work, we have not yet discovered a filling possessing the colour and texture of a human tooth, which shall be as lasting as gold and amalgam, and in the

workroom we cannot find out a substance possessing the beauty of so-called continuous-gum, which shall be as easily worked as vulcanite.

So, gentlemen, it seems only too obvious that, as soon as our student days are over, we must begin to learn, and I maintain that the value of an extended education is proportionate exactly, in so far that it only teaches us how to learn. And this is why I am so earnest an advocate of the dental student taking the conjoint diploma and the Fellowship, whenever it lies in his power, for it simply teaches him how to learn.

There is one subject to which I should like to allude, and that is the establishment of a gold medal to be awarded (after examination and under certain conditions) to the best student in the United Kingdom from any of the Dental Schools, and the name by which that medal shall be known is one which, I am sure, will rise to every lip, and that is the "Sir John Tomes' medal!" Then again, gentlemen, there is a topic which is of too controversial a nature to discuss in this address, I mean the proposed higher diploma in dental surgery, but I, for one, should welcome the day when every qualified dental surgeon would regard membership of this Odontological Society as a higher diploma, to be obtained only as the results of some good and original work, and of probity in private and professional life! If need be the hall-mark of royal recognition might be sought, so that the members might be entitled to the proud string of letters after their names—of L.D.S. and M.R.O.S.!

Mr. Henry Sewill contributed a casual communication on "the etiology of empyema of the antrum." In the paper read by Dr. Felix Semon before the Society last year, the etiology of empyema of the antrum was exhaustively discussed; the writings of authorities were collated, and it was shown that a preponderating weight of opinion supported the view that, although occasionally it may be due to extension of inflammation from accessory nasal cavities, the cause of suppuration within the antrum in a vast majority of cases must be sought in dental disease. This is the view adopted by Dr. Semon, and that also which Mr. Sewill would uphold after having assisted in the treatment of a considerable number of cases. Of these cases a majority have shown the presence of dental disease amply sufficient to account for the empyema. In some few instances the teeth in the neighbourhood of the antrum had been extracted before the case came under observation, and in one the jaw had been edentulous for years; but in every case there was a history of dental disease, and in most instances a clear association of this with the setting up of mischief within the antrum. The only pathological condition of the teeth which in Mr. Sewill's opinion seemed capable of exciting empyema of the antrum were such as are capable of causing direct purulent or septic infection, namely, inflammation, followed by gangrene of the entire pulp, or of that of at least one root of a molar; and suppuration around the apex of a root—periodontitis—which may be attended by necrosis or other morbid changes in the root-end. In most cases Mr. Sewill has been able to diagnose the existence of one or other of these conditions, and on extraction of the tooth has found in addition in a considerable proportion an opening—often very minute—from the alveolus into the antrum. In consultation with Dr. Semon and Mr. England Mr. Sewill had lately seen a case in which dental disease seemed the only possible cause; and yet, although a decayed tooth was present, it proved on extraction not to be the seat of either of those pathological changes which have hitherto in his opinion appeared those alone capable of giving rise to empyema. The patient, a

lady about middle age, had suffered from characteristic symptoms for about two months. A careful differential diagnosis by Dr. Semon demonstrated the nature of the case, and also eliminated every possible cause except the teeth. Considerable tooth-ache had been present, before and during the antral symptoms, in the second bicuspid of the affected side. Examination showed the other neighbouring teeth to be free from active disease. The bicuspid was extensively carious. The pulp was exposed, and about two-thirds destroyed, but the last third retained its vitality and was extremely sensitive. The tooth was slightly sensitive to percussion, but there was no other sign or symptom of periosteal inflammation. Mr. Sewill gave it as his opinion, and Mr. England agreed, that the dental disease was not enough to form an efficient cause of empyema, but Dr. Semon being positive as to his diagnosis, and it being necessary in any event to open the antrum, they extracted the bicuspid. Examination showed that a portion of recent pulp occupied the upper portion of the canal; the external surface of the root exhibited but slight signs of inflammatory activity. A communication between the alveolus and the antrum, admitting a bristle-wire probe, was found. The opening was enlarged in the usual way, and the diagnosis was confirmed when a large accumulation of fetid, inspissated pus was washed out by the syringe through the nose. As in most cases due to dental disease, and not of very long standing, this case rapidly improved under the usual treatment. The point of interest in the case is the apparently insufficient amount of dental disease; and it would lead Mr. Sewill in future more strongly than hitherto to insist upon the necessity of extracting teeth in every case of empyema in which they might be suspected as sharing in its causation. If so small an amount of dental disease be capable of giving rise to empyema, it followed that a careful watch should be kept on cases where decayed teeth exist in the neighbourhood of the antrum, and it pointed to a danger in the so-called crown bar and bridge work in which diseased roots are often sealed, and so shut in that exudations can only find vent by burrowing towards the antral cavity. The

question of the etiology of empyema was very important, the disease being much more common than is usually supposed. Mr. Sewill had lately tapped the antrum in five cases in as many weeks—four with Dr. Semon and one with him and Mr. Christopher Heath. Many patients go on suffering for years before the true nature of their malady is suspected. In the case just related a correct diagnosis was made within a few weeks, but in two other of the cases the patients were not so fortunate. In one, a young lady had suffered for not less than ten years; in the other, a gentleman, the malady had lasted many months, and he was put to great pain by treatment directed to the nasal cavities. It seemed the exception to meet with a case in which an early diagnosis had been made. Patients very rarely suspected the teeth, and did not apply in the first instance to a dental practitioner. Few minor surgical diseases give rise to more distress. Not to speak of the pain, which is very often considerable, the patient is condemned to the perpetual consciousness of a noisome odour, and is troubled by a fetid discharge from the nose. Be it noted, the discharge is from one nostril only and not continuous, but occurring at intervals. These —the characteristic symptoms—are quite enough alone to produce great depression and injury to the general health. Mr. Sewill exhibited the tooth, and said he should be glad if it could be minutely examined and reported on later by the honorary Curator.

Mr. Charters White then read a casual communication on "a new method of demonstrating the structure of dental and osseous tissues." In the course of his microscopical investigations into the histology of the dental and osseous tissues it occurred to him, that while the present method of mounting them for examination was far superior to the old plan of dry mounting, yet it left much to be desired in clearly revealing any deviation in the ordinary structures; for as Mr. Charters White had pointed out on many former occasions, the balsam in which they were mounted, running into any cavities such as the lacunæ and canaliculi of bone,

or the dentinal tubuli of teeth, so obliterated them that little beyond blank transparency was presented to the eye of the observer, hence he had introduced the plan of mounting such sections in balsam when saturated with water, merely drying the surfaces before putting the section in the balsam; this method prevented any ingress of the balsam into the water-filled cavities, and entirely presented the structures in all their visibility. Mr. Charters White had now devised a method which would add still further to these advantages, inasmuch as cavities could be rendered more readily visible to the highest powers of the microscope. He might be seemingly introducing a trifle, but as life is made up of trifles, especially microscopical life, and any new process, however trifling it might at first appear, might exert an influence in the direction of what might turn out more important in future investigations, therefore he apologetically offered this casual communication, trusting it might be of service to those of the younger brethren who might be pursuing the very fascinating study of the histology and pathology of the dental or osseous tissues.

The process he wished to introduce was not brought forward to demonstrate anything more in the histology of teeth or bone than what had been known from the earliest days of microscopical studies, but merely to show the possibilities underlying its adoption, as not only were the lacunæ of bone infiltrated by this method, but structures as minute as the canaliculi and also the dentinal tubuli were rendered more pronounced, whilst departures from normal conditions were made very evident.

This process is based upon that treatment to which the soft tissues are sometimes subjected, namely, *infiltration*, and the *modus operandi* is as follows: Having cut your bone or tooth to a moderate degree of thinness, place the section in ether for twenty-four hours or more; then transfer it to a thin collodion stained with fuchsine, where it may remain for three or four days till the stained collodion has had time to follow the ether into the minute ramifications of the structure. The section may now be placed in 50 per cent alcohol to harden the collodion and allowed to remain

in this till the opportunity arises for grinding it down. This may be done with ground glass and powdered pumice with water in the way Mr. Charters White usually recommended, taking care, however, to finish off by using worn out ground glass and water only, or the finished section will show particles of pumice powder, which annoys the eye and detracts from the beauty of the preparation. The coloured collodion being insoluble in water, no fear need be entertained of its washing out of the cells of the tissue in the process of grinding down. When sufficiently thin, which may be ascertained by frequent examinations under the microscope, the section may be mounted in balsam without heat, or what is better, a preparation sold by Baker of Holborn, and known as Van Heurck's medium for mounting diatoms. Mr. Charters White thinks if these few simple directions are followed, that with more time and care than he could devote to the process, results far more interesting than those placed under the microscope that evening would present themselves.

Mr. Storey (Hull) then described a case of ununited fracture of the inferior maxilla. Harry Gardener, æt. twelve years, in 1883 was run over by a cab, causing a compound fracture of the lower jaw. This was treated at the Children's Hospital for six months. A central part of the lower jaw was removed, whether at the time of the accident or afterwards was unknown; the probability was, that there were two fractures, one on either side of the middle line, and that the piece of bone thus separated necrosed. The present condition was that of an ununited fracture of the lower jaw, such union as existed being by fibrous tissue, the ends playing freely on each other at the will of the patient. The portion of jaw missing was that containing the right canine to the left first bicuspid inclusive. It was added that the patient appeared to masticate well and was well nourished.

Mr. Henri Weiss for Dr. J. Arkövy (of Buda-Pesth) read the following communication ;—

On Ready Contours and Crowns made of Amalgam.

By Jos. Arkövy, M.D., &c., Buda-Pesth.

Mr. President and Gentlemen,—Contour filling is one of the most prominent subjects now under discussion in dental literature. The subject needs no further advocacy, for our best writers and practitioners have adopted contour filling, and to-day it may be considered as an operation not only destined to exhibit the skill of the operator, but acknowledged to possess the essential basis for an operation, viz., *indications*.

All the disadvantages arising from simply filling approximal cavities of teeth, after separating by the Arthur method, indicate the superiority of contour filling. Restoration of the anatomical shape was the principal and the only scope. A good many instructions and practical hints supporting the task are contained in the literature on the subject, of which you are well aware. Some time ago* the attention of the profession was directed to another point concerning contour fill-

* J. V. Black, M.D., Jacksonville, Ill., "Dent. Rev.," July, 1890; Geo. H. Winkler, M.D., and G. A. Wilson, D.D.S., "Internat. Dent. Journ.," Dec. 1890.

ing; that is, *prevention of injury to the inter-dental space*, viz., inter-dental papilla and the inter-alveolar septum.

It may be considered as proved that any contour filling possessing these two qualities will answer the purpose, and be correct. Gold is maintained to be the best material for contour filling, and no doubt it is in general; but, taking into account the various conditions of approximal cavities in præmolars and molars, which more frequently want contouring than front teeth, it might be conceded that contour fillings of gold are very rarely indicated in such back teeth; because, first, of the regularly wanting wall strength; secondly, the proximity of the cervix; thirdly, the impossibility of control while annealing the first quarter of the gold. If we add to these arguments the effective, and for the case valuable, indication of combined fillings, where we are obliged to put aside gold as being a non-combinable material* in favour of amalgam, then it will be seen that, besides the excessive time and work required in gold contouring in bi- and multi-cuspidated teeth, amalgam (combinable with gutta percha or copper amalgam) would serve

* Tin gold cannot be considered as a combined filling; it is a combined material, and there is no reliable statement as yet that it possesses such qualities as copper amalgam or gutta percha are endowed with.

better than gold, supposing that we are able to use this material for shaping the lost part of the tooth-crown. Hitherto the difficulties in using amalgam for contouring purposes were that it did not keep the contour when properly mixed, and, if it did, it usually had a surplus of mercury, and would be expected to undergo shrinkage and low edge-strength. I pass over the difficulty which we encounter during the process of shaping. An incisor or canine can never be compared in that respect with either a bicuspid or a molar crown, as the true morphological form can hardly be attained.

To meet the exigencies of making amalgam serviceable for contouring, and even crowning purposes, I have the honour to bring before you a somewhat new method of operation and of using that material. The starting idea was: Why should we build up contours, parts of crowns, and whole crowns by such an amount of labour, the former losing parts just when nearly ready, the latter again (crowns) being dependent on a foreign filling material, which will never intimately unite with the crown (porcelain or metal) itself? If we had prepared præmolars and molars of amalgam, wherever a large amalgam filling is indicated, the prepared piece of the amalgam crown would unite intimately with the filling in the cavity, and give us filling and contour or the whole crown

with one blow, and would provide us with a tooth crown very much in advance of all that could be made by freehand shaping. At the same time, we should not be obliged to deviate from the right way in being able to use on the cervical part copper, and sometimes even gutta percha, for prevention of re-decay.

The præmolars and molars, which I have the pleasure of presenting now, are made after natural teeth,* and possess the precise morphological shape which we want for crown work, or, cut into segments, for contours. The directions for use may be summed up as follows :—

1. Take impression and bite from the prepared tooth, and selecting the anatomically suitable amalgam crown, have it fitted in your laboratory to the model, somewhat lower than articulation requires ; one millimeter will do. If one part of the crown is wanted, have it cut by a thin saw, and filed as required, and the hollow (inner) part provided with retaining pits or deep undercuts (Arthur disc). For contouring purposes the molar crowns may be cut into 2—4, the præmolars into 2—3 segments, reserving the not applied part for another suitable case. Time hardens, and air has no deteriorating effect upon the crowns.

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* Their production, modelling, &c., are difficult, and require time, and a description of the process would probably exceed the limits of a short paper. The crowns will be supplied by the dental depôts.

2. When starting for stopping, put the piece (crown or contour) into chloroform, in order to get rid of any fat that may possibly adhere to the mass. The amalgam for the filling being prepared, take a small quantity of it, with the addition of one small drop of mercury, and rub that in with a polisher upon the surface furnished with undercuts. Now fill the amalgam into the cavity (with or without cofferdam) to the level of the edges, covering these as well. Then put the amalgam crown or contour upon the filling, pushing the piece with your two forefingers several times, in labio-lingual direction, until it attains its proper position. No hard pressure should be exercised upon the contours, their body being too weak; entire crowns, however, ought to be pressed firmly by finger or a wooden rod. After that, polish, and take off *very carefully* the rubber dam, if in use; and push a small piece of letter paper between contour or crown and approximal surface of the next tooth, in order to keep the piece in place. For fixing the entire crowns rubber rings may be used, or any means applied which may be deemed fit. For entire upper crowns it is advisable to drill cautiously through the mass (crown fissure), for the amalgam filling will more easily keep it in place, and counterbalance its dropping before setting ensues.

Special care is now needed for exclusion of

moisture, for leaving no space between piece and tooth, and for saving the work from all unnecessary movement, on the part either of the operator or of the patient.

3. As the setting requires at least four hours, the patient ought to be requested to take that into account. After the lapse of that time, remove the paper wedge, and the finishing will be effected by lava strips drawn through the interspace upon the cervical part, and a circular brush dipped first into alcohol, and then in pumice stone powder. The best plan is to finish and polish five hours after operation on the same or the next day. Dissuade the patient from masticating on that side for two or three days. As to amalgam, any preparation may be used, even copper amalgam as a combination on the cervical border of the cavity, or alone. In the latter case at least eight hours would be required for setting.

If possible, and where a root filling has been effected, try to make a slightly conical angle on the approximal surface. The labial and lingual borders of the cavity will offer in that way a solid basis for the contour, which will easily bear the work of mastication. In cases where the loss of substance is much less the contour piece should be cut in an oblique line, corresponding to the ground-off surface of the tooth—the larger portion joining the grinding, the thin portion the cervical part.

Since the 15th of September, 1890, I have been using these amalgam crowns for contouring and crowning purposes in bicuspids and molars where they were indicated. Here I give a list of cases :—

LIST OF CASES TREATED BY READY CONTOURS AND CROWNS OF AMALGAM, SEPT. 15, 1890 —JAN. 24, 1891.

	RIGHT SIDE.					LEFT SIDE.					Remarks.
	III. Mol.	II. Mol.	I. Mol.	II. Prm.	I. Prm.	I. Prm.	II. Prm.	I. Mol.	II. Mol.	III. Mol.	
Upper.			$\frac{1}{3}$, $\frac{1}{2}$. $\frac{1}{3}$, $\frac{1}{2}$.	$\frac{1}{3}$, $\frac{1}{3}$, $\frac{1}{3}$.	$\frac{1}{3}$.	...	$\frac{1}{3}$.	$\frac{1}{2}$, $\frac{1}{4}$.	1*.	...	* Failure produced by omission of fixation while setting was going on.
		$\frac{3}{4}$**.	...	...	...	...	...	...	...	...	** Same, plus hard friction by the cheek. Second trial again in vain.
Lower.	$\frac{1}{2}$, $\frac{3}{4}$.	$\frac{1}{2}$, $\frac{1}{2}$, $\frac{3}{4}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{3}$.	$\frac{3}{4}$, $\frac{1}{4}$, $\frac{1}{2}$.	... ...	... ...	... ...	$\frac{1}{4}$.	1, 1, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{4}$*, $\frac{3}{4}$*, 1.	$\frac{1}{4}$, $\frac{3}{4}$, $\frac{3}{4}$.		* Failures by leaving a too hard bite upon the contour; repaired in 5 minutes

The fractions mean restored portions of tooth-crown.

Models...	...	36
Soft models	...	10
Total	...	46 Cases.

If a small portion of the contour should happen to come away, this can be easily restored by the addition of some pits to the remaining portion.

The cases here enumerated are too few, and the time for observation of the results is too short, to allow of my arriving at accurate conclusions as to their ultimate usefulness. But, there being no

theoretical or practical objection to the admissibility of the operation, and as it offers great advantages to our profession, I decided to make it known for the benefit of my fellow-practitioners and the patients hitherto sadly exposed to the troubles, disfigurements, &c., inseparable from permanently separated teeth.

The PRESIDENT invited comments if the members had had sufficient opportunity to examine the samples passed round.

Mr. W. H. COFFIN said Dr. Arkövy's specimens seemed to divide themselves into Bonwill crowns, made of amalgam and fastened on with amalgam, and amalgam inlays necessitating the taking of an impression which had to be sent into the laboratory. Mr. Coffin expressed a strong opinion that if a model for an impression or cavity were taken, a filling made in the usual way upon the model would be preferable to cutting and fitting the inlay from the solid.

The PRESIDENT then called upon Dr. Silk to read his paper.

Observations on Bromide of Ethyl in Dental Surgery.

By J. Fred. W. Silk, M.D.

Anæsthetist to Guy's Hospital (Dental School); to the Hospital for Epilepsy and Paralysis (Queen Square); Anæsthetist and Lecturer on Anæsthetics Royal Free Hospital.

Mr. President and Gentlemen,—In America and on the Continent, and especially in Germany, Bromide of Ethyl has for some time past been held in high repute by dental surgeons. In this country, however, I know of no records of its systematic employment in a similar manner; I was, therefore, very willing to fall in with the suggestion made to me in the summer of 1889, by my friend and colleague Mr. Newland-Pedley, and endeavour to obtain some personal experience of the action of this drug.

In laying before you the record of my observations, I am particularly anxious that it should not be considered that I appear as an advocate for the indiscriminate use of the drug, or that I in any way suggest that we have in bromide of ethyl, an entirely satisfactory substitute for any of the agents usually employed for the purposes of the dental surgeon. In the table of cases appended (Appendix A) I have endeavoured to

record in a strictly impartial manner my own experiences, and in the remarks which I am about to make in elucidation of this table I shall endeavour to be equally impartial, leaving each of you to form your own opinion as to whether the drug is worthy of more extended trial.

History.—The anæsthetic history, so to speak, of bromide of ethyl, is a very curious and instructive one, but hardly comes within the scope of the present paper. In appendix B I have made a list of the most important authorities, and it will therefore suffice if I here mention that bromide of ethyl was first used as an anæsthetic by Nunneley, of Leeds, in 1849; was again brought forward by him in 1865, and some years later its use was advocated by Turnbull and by Levis in America. For its introduction into dental work we are, I fancy, indebted to Schneider, of Berlin, and Herz, of Vienna.

Properties.—It is not my intention to discuss in detail, either the physical and chemical properties or the physiological action of the drug, but in the course of this inquiry one or two points of practical importance have cropped up, to which I feel bound to refer.

In the first place, when you ask for bromide of ethyl (C_2H_5Br.) be sure that your order is understood. By a mistake on the part of a

chemist, bromide of ethylene ($C_2H_4Br_2$) has been substituted, and with fatal results. In the majority of my cases I have used Merck's preparation of the bromide, which is the one almost universally employed in Germany; in some few instances an English sample of the drug was used, but although I am assured by Mr. Martindale, the chemist, that the chemical purity of this latter was quite equal to the German, yet I have not any doubt in my own mind as to the difference in the effects produced, the difference being strongly in favour of Merck's.

It is very probable that this variation in the effects, may be partly or even entirely explained, by the decomposition which the drug apparently undergoes on keeping, especially if exposed to light and air. If you refer to cases 16 to 20 you will see, that when a sponge was used which had been inadvertently left unwashed after the previous series of cases, the results were pre-eminently unsatisfactory.

It is usually asserted that one of the chief reasons which led to the disuse of the drug in 1849 was its cost, and although this is of course a minor point, yet I think I may safely say, that where any number of administrations are undertaken, the cost per patient is very little more than half the cost of nitrous oxide.

Sex and Age.—Coming now to the consideration of the various columns of my table of cases. Both sexes have been dealt with in about the usual proportions, and the ages have varied from nine to forty-nine years. I think, however, that it would appear, that robust and healthy males tolerate the drug better than weakly anæmic females, or than children.

Dose.—Of course the amount necessary to produce anæsthesia varies *inter alia* with the method of administration. Thus, with the open or semi-open method, as in the first seven cases, 70m to ʒiii were required. With the closed method, on the other hand, ʒiss has usually proved ample, and in many instances ʒi has sufficed. In making this estimate I have taken into consideration only single cases or first cases of a series, for as you see, in many instances the dose recorded simply represents the amount added to an unknown quantity remaining in the inhaler from the preceding case. But still I think there are a sufficient number of these single and first cases to warrant me in putting the dose down at ʒi to ʒiss. I am inclined to emphasize this point, because I fancy that a good deal of misapprehension exists on this score. For instance, the *British Medical Journal** has

* 1890, Vol. ii. p. 857.

recently commented upon a death which followed the use of bromide of ethyl, and says that "not more than twenty grammes" were administered, but as this represents considerably over

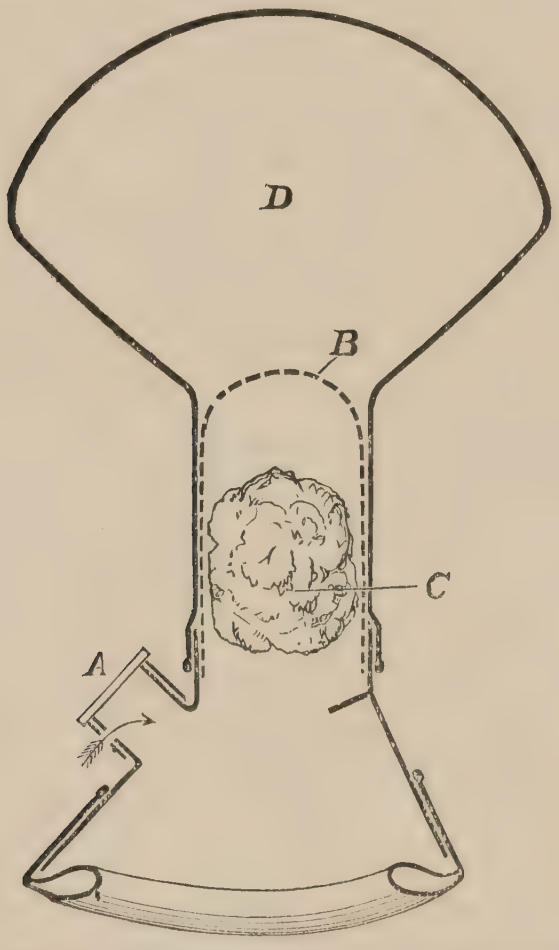

Fig. I.—Sectional view of Ormsby's Inhaler.

A—Air-hole. B—Wire cage, containing sponge C, over which is placed the rubber bag D.

half an ounce, I should myself be inclined to express surprise at the largeness, rather than at the smallness, of the dose.

Method of Administration.—In the first seven administrations either a leathern cone, fitting

closely to the face, and open at the apex in which a small piece of absorbent material was placed, or a Skinner's frame-inhaler were used, but neither of these plans quite satisfied me. In August last year I attended the International Medical Congress at Berlin, mainly with the object of obtaining some information upon this subject. I had thus an opportunity of observing the methods in vogue at the Berlin Dental Hospital, and consequently administrations 8 to 94 have been conducted by means of an ordinary Ormsby's inhaler.

In using this inhaler, the drug is poured through the facepiece on to the sponge, and it is then fitted to the face; little or no air is admitted for the first few inhalations, after which the cap of the airhole is slightly turned.

Time limits.—In estimating the time taken to induce anæsthesia, it would obviously be unfair to include all methods of administration together. Taking, therefore, only the closed method, *i.e.*, when the Ormsby's inhaler was used, I find that I have recorded twenty observations, from which I estimate the average time of induction to be 66.8 secs., or slightly less than in the case of nitrous oxide. The duration of the anæsthesia thus produced I found to be 46.2 secs., an average arrived at from the consideration of twenty-eight cases—this is nearly half as long again as with nitrous oxide.

Roughly speaking, the duration of the anæsthesia bears some relation to the time required for induction, but of course this is by no means absolute, and with the English samples of the drug the variability is very marked. It would certainly appear, too, that when the time from the commencement of the inhalation to the end of the anæsthesia exceeds two minutes, the after-effects are very likely to be troublesome.

Phenomena.—The question which I have most frequently had to answer has been: "How do you know when a proper degree of anæsthesia has been produced?" The reply to this is not so simple as might appear. In Berlin some stress seems to be laid upon the muscular relaxation, but I have not found that this is at all reliable. I have myself generally removed the facepiece when the faintest stertor is heard, or if that is obviously due to accidental causes, or if it is unduly delayed, the commencing weakness of the pulse or the development of conjunctival insensibility are my guides. The stertor to which I refer is not the laryngeal stertor of nitrous oxide narcosis, but of a much lighter and regular kind, originating probably in the palate.

During the course of the inhalation, I think it will be found that the breathing becomes very slightly slower and shallower, but in the majority

of cases these changes are almost inappreciable. I have never been able to detect any irregularity in the rhythm, nor, as a general rule, has any cough, laryngeal spasm, or bronchial irritation been set up. In speaking thus of the effects upon the respiration, I would remind you that my remarks apply, only to the special methods adopted in the production of anæsthesia for the purposes of the dental surgeon, and are not in any way applicable to the effects produced when the anæsthesia is prolonged.

There can be no doubt, I should think, that the cardio-vascular or circulatory system is much disturbed during the inhalation of bromide of ethyl. The primary flushing of the face is, I think, a pretty constant phenomenon, though it may be but momentary in its duration; this effect is very similar to that produced by nitrite of amyl, and, I should fancy, may be explained in the same way, *i.e.*, arterial dilatation with consequent fall of blood pressure. This fall in blood pressure may, no doubt, to a certain extent, in itself account for the diminution in force, and increased frequency of the heart beat, as observed at the radial pulse. It is highly probable, however, that other factors are at work, for to the flushing quickly succeeds a pallor, and the heart's action tends to become more feeble, slower and irregular.

I do not myself profess to be a good interpreter of sphygmographic tracings, which may possibly be the reason why I am somewhat sceptical of their value. Others, however, may have more ability, and greater faith in this direction, so I show you (figs. II. to VII.) a few of the many tracings I have taken. In each set the capital letter (A, B, &c.) points to the trace taken immediately before the inhalation commenced, while the small letters (*a*, *b*, &c.) point to the trace taken at the height of the anæsthesia, *i.e.*, immediately after the facepiece was removed.

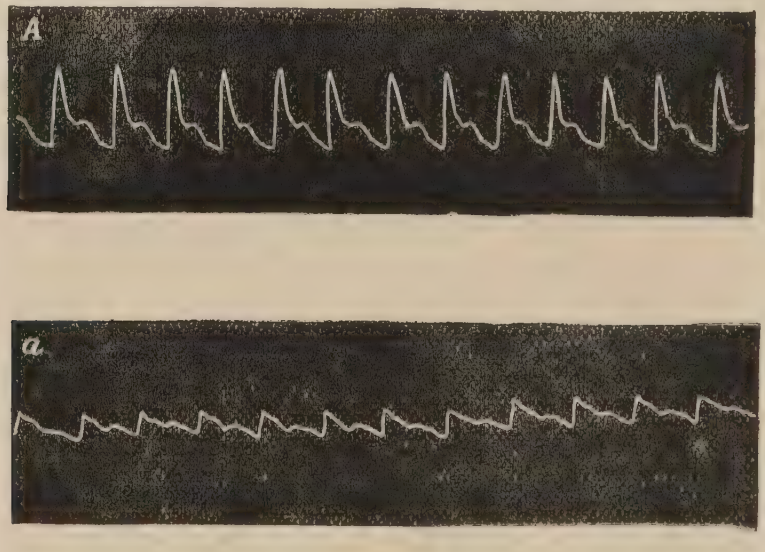

Fig. II.
Case 58, F., æt. 21 ; dose 5i.

I think, on the whole, these tracings bear out the views I have put forward in respect to the effects of the bromide upon the circulatory system, especially if we remember, that the heart's

action immediately before the inhalation is unduly accelerated by the nervous condition of the

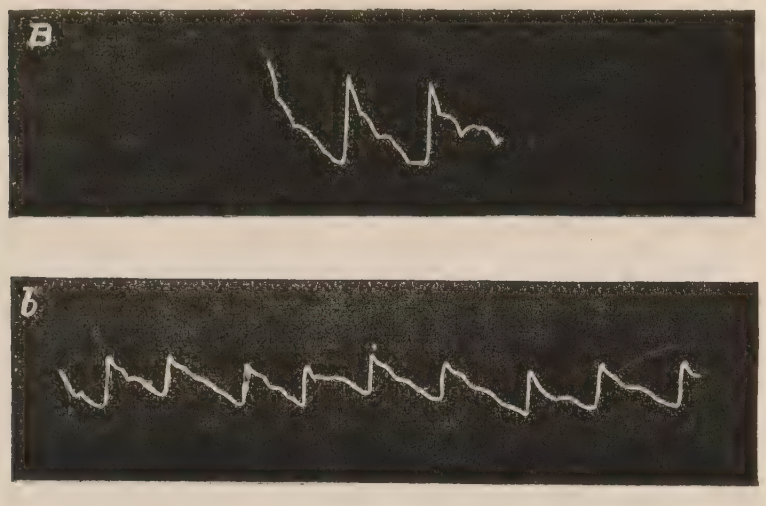

Fig. III.
Case 65, F., æt. 24 ; dose 3iss.

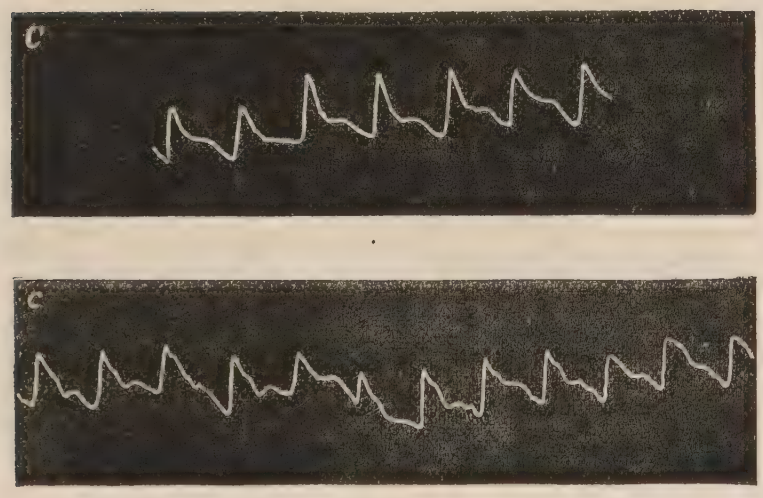

Fig. IV.
Case 66, F., æt. 25 ; dose 3ss. added to No. 65.

patient. Tracings of the F series (Fig. VII.), I think, are particularly interesting, as indicating (f' taken soon after recovery) the rapidity with

which the blood-pressure, &c., is restored. This rapid recovery is, I believe, usual, and is of great importance.

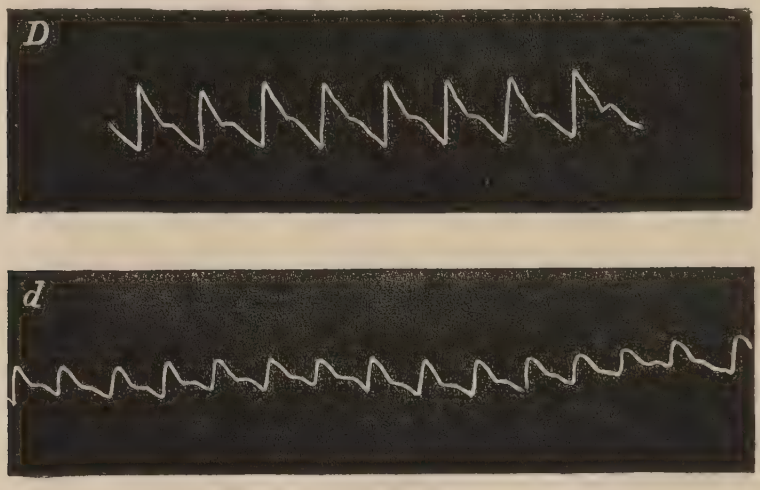

Fig. V.
Case 83, M., æt. 23 ; dose 3iss.

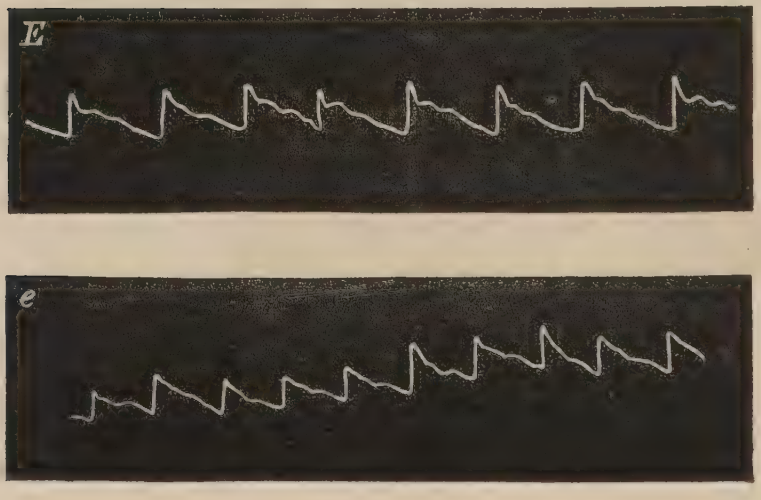

Fig. VI
Case 92, F., æt. 21 dose 3i. added to No. 91.

In respect to the influence of the drug upon the nervous system, and through it upon the muscular system, there is one point with which

I have been particularly struck, *i.e.*, the exceedingly transient character of the stage of excitement. In the majority of cases this stage has been almost inappreciable, and in all but Case 5 quite evanescent. This observation would seem

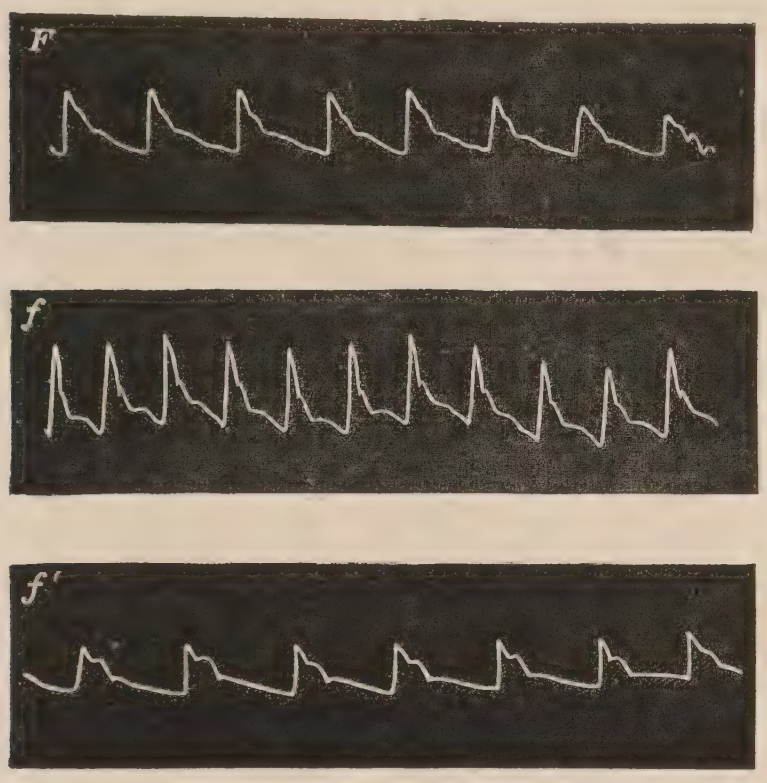

Fig. VII.

Case 94, M., æt. 23 ; dose 5i. added to No. 93.
f' Taken ten minutes after recovery.

to apply almost equally to nervous women, and to the robust and probably alcoholic navvy, and it may possibly serve as an indication for the class of cases, in which the use of the drug is more particularly appropriate. Occasionally we get a very slight spasm of the fingers, or rhythmic move-

ments of the limbs, &c., but I have never observed anything like the degree of spasm and movement which often accompanies nitrous oxide and ether.

In respect to other phenomena I have not much to say. The pupils tend to dilate. Increase in the salivary secretions was sufficiently marked to attract attention in Cases 21, 26, 28, and 29, but I have never seen it so copious as with ether. In some few instances the patients will make a groaning noise from the beginning of the inhalation, but this I have always ignored, and have not found that it either delayed or shortened the narcosis.

The anæsthesia which has resulted from the use of the drug has, to my mind, always been quite satisfactory, both in degree and kind, but on this point I hope we may have the testimony of those who have operated in some of the cases recorded.

After Effects.—The after-effects of an anæsthetic are of very great importance, not only to the patient, but also to the dental surgeon. They may be divided into those observable immediately after the return to consciousness, and those developed at a more remote period.

In respect to immediate effects of bromide of ethyl, I have definite notes in thirty-nine instances. In eleven a certain amount of hysteria resulted; in ten others, more or less depression

or prostration occurred. In one instance (No. 69) actual fainting ensued, but this was in a patient subject to what she termed "fainting fits." Actual sickness was noted in two cases (Nos. 1 and 19), and in seven others nausea was complained of. Slight and transient degrees of exhilaration were developed in three instances (Nos. 74, 83, and 91), and in many of the cases a certain amount of confusion of intellect has remained for some few minutes. Strictly speaking, of course, all these figures refer only to the thirty-nine cases noted; but in respect to the fainting and vomiting, I think that the numbers may very fairly be held to be applicable to the whole series, as it is extremely unlikely that such effects, if they had occurred, would have remained unrecorded.

By making use of post cards printed with my address, I have been enabled to obtain a rough estimate of the remote effects of the bromide in 45 instances. Of this 45, in no less than 29 the return was to the effect that the patients were perfectly well on their return home, and for the remainder of the day. Of the remaining 16, prostration or depression is noted in 5 instances, vomiting in 2, and headache in 3. In Case 55 the return was, "ill all day," but I was not able to ascertain of what this illness consisted; possibly it may have been simple hysteria. Of the

remaining 5, dizziness, drowsiness, and other very trivial and doubtful complaints are recorded.

But there is another aspect of this question, viz., the relation between immediate and remote effects. In 17 cases observations of both appear in the table, and from these we gather, as might be expected, that the importance and severity of the remote symptoms is tolerably proportionate to the immediate after-effects. Thus, simple hysteria has seldom been followed by anything worse, while, on the other hand, nausea may be followed by sickness, or the sickness may be prolonged. This somewhat negative evidence is of importance, for it enables me to say that, so far as my own limited experience is concerned, I have never met with a case in which serious symptoms have developed upwards of twelve hours after the bromide has been inhaled. Such cases have, however, been described.

Death-rate.—In preparing this paper, I have been very strongly tempted to refer to the dangers and the death-rate of bromide of ethyl, but on the whole I prefer to adhere to my original plan, and limit my remarks strictly to the facts that have come under my own cognisance, as exemplified in the record of cases. I am well aware of the importance of this point, however, though I cannot help thinking, that the fatalities which have been hitherto recorded, rather tend to exaggerate the

dangers of the drug when used in dental surgery and in the way I have to-night described.

Conclusion.—Such, gentlemen, is my experience of the use of bromide of ethyl as an anæsthetic in dental surgery. In many points this experience is favourable, in many others adverse; so that, taking into consideration the relatively small number of cases which I have recorded, it will not be expected of me to express dogmatic opinions upon the value of this potent drug. Before sitting down, however, I must apologise for the length of my paper, and at the same time I should like publicly to express my indebtedness to Mr. Maggs and Mr. Mansbridge, and my other colleagues of the Guy's Hospital Dental School, for the permission they have so readily given me to use their cases for the purposes of this investigation. Without this help, and that of the senior students of the school, I could have accomplished nothing, and even now I feel that the result has been far less satisfactory than I could have wished.

No.	Sex. Age.	Quantity.	Method.	Time.		Phenomena.	
				Induction.	Anæsthesia.	Respiration.	Circulation.
1	F 20	3ii. in two separate doses.	Long leather cone, open at apex, with lint inserted.	...	...	Fair; no cough, slight palatine stertor.	Flushing of face, followed by pallor.
2	F 19	3ii. in two separate doses.	Leather cone, open at apex, with lint inserted.	125 secs.	...	Fair; no cough, no stertor.	Flushing of face, less marked than in No. 1, pulse became irregular.
3	F 17	3iii. in successive doses of 3i.	Corner of towel.	5 m.	...	Fair; slight laryngeal spasm, no stertor.	Flushing of face; pulse intermittent, subsequently full and bounding.
4	F 18	3ii. ℥x.	Guttatim on Skinner's cage.	...	...	Fair; becoming slow, slight intermittent stertor towards end.	Flushing followed by pallor of face; pulse intermittent, then after face-piece removed, becoming full and bounding.
5	F 27	70 ℥.	As Case 4.	...	...	Restrained.	Pulse gradually failing, subsequent re-action as in Case 3.
6	F 36	3ss.	As Case 4.	...	...	Fair, becoming shallow.	Pulse good during inhalation, feeble after.
7	F 28	3iss.	As Case 4.	3½ m.	...	Same as Case 6.	Pulse failing, and decidedly feeble after face-piece removed.
8	F 18	3ii.	Ormsby's inhaler—no air for first 5 or 6 inhalations, then a little	...	...	Fair, no stertor.	Primary flushing of face, pulse fair but failing, decidedly feeble just after.
9	F 12	3i. added to above.	As Case 8.	...	...	Shallow, slight stertor.	... Same as No. 8. ...
10	F 22	3i. added to No. 9.	As Case 8.	...	...	... Fair. ...	... Same as No. 8. ...
11	F 40	3i. added to No. 10.	As Case 8.	...	...	Same as No. 10.	... Same as No. 8. ...
12	F 29	3ss. added to No. 11.	As Case 8.	...	...	Same as No. 10.	... ...
13	F 27	3i. added to No. 12.	As Case 8.	...	...	Same as No. 10.	... Same as No. 8. ...
14	F 33	3i. added to No. 13.	As Case 8.	...	...	Groaning from beginning, not ceasing during height of anæsthesia.	... ...
15	F 26	3iss.	As Case 8.	...	...	Fair; groaning all time.	... Primary flushing. ...
16	F 22	3i. added to No. 15.	As Case 8.	50 secs.	50 secs.	... ...	Pulse became very small.
17	F 33	3i. added to No. 16.	As Case 8.	70 secs.	40 secs.	Groaning all time.	... ...
18	F 24	3i. added to No. 17.	As Case 8.	75 secs.	65 secs.	... Stertor. ...	... ...
19	F 31	3i. added to No. 18.	As Case 8.	95 secs.	55 secs.	Restrained.	... Slight lividity. ...
20	F 24	3i. added to No. 19.	As Case 8.	45 secs.	...	... Fair. ...	... ...
21	F 20	3iss.	As Case 8.	50 secs.	45 secs.	... ...	Pulse became weaker; very free flow of saliva.
22	F 46	3i. added to No. 21.	As Case 8.	65 secs.	50 secs.	Regular stertor.	... ...

	After-Effects.		
Muscular and Nervous.	Immediate.	Remote.	Remarks.
omplete relaxation. No excitement, pupils slightly dilated, conjunctivæ injected, but not absolutely insensitive until after face-piece removed.	Tendency to syncope; prostration; sick.	Sickness continued for some little time.	
omplete relaxation. Hysterical laughing during inhalation, otherwise as in No. 1.	... .	... ...	Anæmic girl.
omplete relaxation. Conjunctivæ injected and not insensitive, pupils dilated.	Retching.	Prostration.	Anæmic girl.
omplete relaxation. Very transient excitement, pupils slightly dilated, conjunctivæ insensitive.	Tendency to syncope and nausea.	Nausea.	Had just taken alcohol.
arked and uncontrollable excitement.	Syncope.	... ...	Very nervous woman.
... ...	Prostration.	... ...	Duly pushed to relaxation, said she felt extraction.
... ...	Nausea and prostration.		
o subsultus. Pupils unaffected, conjunctivæ not insensible until just after face-piece removed.	Transient depression.	Nil.	
light spasm. Pupils dilated.	Same as No. 8.	Looking pale, but feeling well.	
... ...	Same as No. 8.	Nil.	
onjunctivæ not insensitive until after face-piece removed, pupils unaffected.	Same as No. 8.	Nil.	
... ...	Same as No. 8.	Slightly dizzy.	
... ...	Same as No. 8.	... ...	Hysterical—said to have had "brain fever."
light spasm. Pupils dilated.	Hysteria.	Slight headache.	Some time coming round.
accidity.	... ...	... ...	Anæsthesia imperfect.
reaming after removal of face-piece.	... ...	Nil.	Anæmic. Unwashed sponge used.
... ...	Hysteria.	Nil.	Anæmic. Unwashed sponge.
upils dilated.	Nausea.	Vomiting.	Unwashed sponge.
... ...	Sick.	Prostration.	Unwashed sponge.
reaming after removal of face-piece.	... ...	... ...	Unwashed sponge.
upils dilated	... ...	Languid.	
Pupils, if anything, smaller.	Dazed; nausea.	Nil.	

No.	Sex, Age.	Quantity.	Method.	Time.		Phenomena	
				Induction.	Anæsthesia.	Respiration.	Circulation.
23	F 20	3i. added to No. 22.	As Case 8.	45 secs.	27 secs.	... ...	... ...
24	F 22	3i. added to No. 23.	As Case 8.	60 secs.	50 secs.	Stertor commencing.	... ...
25	F 38	3i. added to No. 24.	As Case 8.	...	...	Groaning all time.	... Pulse became small.
26	F 20	3i. added to No. 25.	As Case 8.	65 secs.	60 secs.	Stertor (saliva).	... Free flow of saliva.
27	F 22	3i.	As Case 8.	...	...	... Fair. ...	... ...
28	F 24	3ss. added to No. 27.	As Case 8.	80 secs.	40 secs.	... Fair. ...	... Free flow of saliva.
29	F 40	3ss. added to No. 28.	As Case 8.	70 secs.	75 secs.	Fair; very slight stertor.	... Free flow of saliva.
30	F 9	3ss. added to No. 29.	As Case 8.	40 secs.	40 secs.	Restrained, slight stertor.	... ...
31	F 17	3ss. added to No. 30.	As Case 8.	40 secs.	55 secs.	Slight stertor.	Pulse beginning to fail.
32	F 18	3ss. added to No. 31.	As Case 8.	68 secs.	55 secs.	... ...	... ...
33	F 22	3i.	As Case 8.	...	...	Slight stertor.	... ...
34	M 14	3ss. added to No. 33.	As Case 8.	...	...	Slight stertor.	Pulse commenced to intermit.
35	F 32	3ss. added to No. 34.	As Case 8.	...	...	Slight stertor.	Pulse became weaker, but regular.
36	F 13	3ss. added to No. 35.	As Case 8.	...	...	Stertor very early; slightly irregular at end.	Pulse commenced to intermit.
37	F 16	3ss. added to No. 36.	As Case 8.	...	...	... ...	Pulse unaffected. ...
38	F 25	3i.	As Case 8.	...	...	Fair; slight stertor.	... Pulse failing.
39	F 22	3ss. added to No. 38.	As Case 8.	...	...	Same as No. 38.	... Same as No. 38.
40	F 18	3ss. added to No. 39.	As Case 8.	...	...	Same as No. 38.	... Same as No. 38.
41	M 15	3ss. added to No. 40.	As Case 8.	...	...	Regular and deep.	... ...
42	M 17	3ss. added to No. 41.	As Case 8.	...	...	Fair; stertor.	... ...
43	M 15	3ss. added to No. 42.	As Case 8.	...	...	Same as No. 42.	Pulse slowed, force increased.
44	F 21	3i.	Ormsby, a little air from first.	...	...	Same as No. 42.	... ...
45	F 19	3i. added to No. 44.	As Case 44.	...	...	... ...	... ...
46	F 24	3ss. added to No. 45.	As Case 44.	...	...	... ...	... ...
47	F 30	3ss. added to No. 46.	As Case 8.	...	67 secs.	Groaning all time.	... ...
48	F 17	3i.	As Case 8. English drug.	...	...	... ...	Pulse failing. ...
49	F 19	3ss. added to No. 48.	As Case 48.	...	30 secs.	Faint stertor.	Pulse failing. ...
50	F 19	3ss. added to No. 49.	As Case 48.	...	...	Slight stertor.	Pulse failing. ...

Muscular and Nervous.	After-Effects. Immediate.	After-Effects. Remote.	Remarks.
... ...	Same as No. 22.	... ...	Stunted and anæmic, double cataract.
... ...	... ...	Nil.	Anæmic. Same patient as No. 16.
Pupils, if anything, smaller.	Feeling faint.	Nil.	
onsiderable excitement at first, endency to opisthotonos.			
... ...	... ...	Nil.	Same patient as Nos. 16 and 24.
... ...	... ...	Very heavy and drowsy.	
... ...	... ...	... ...	Same patient as No. 11. Recovery very slow.
me struggling, tendency to pisthotonos. Screaming directly facepiece removed.	... ...	... ...	Unsatisfactory.
ight struggling. Screaming directly face-piece removed.	... ...	Slight headache.	
regular movements of legs. Pupils unaffected.	... ...	Nil.	
ight spasm of fingers, twitching and spasm of flexors of wrist. Pupils not dilated.			
pils unaffected.	... ...	Nil.	
pils slightly dilated, excitement with shouting after facepiece removed.	... ...	Nil.	
... ...	Hysteria.	... ...	Poorly nourished, took a good deal, recovery slow and bad.
pils unaffected.	... ...	Nil.	
me as No. 38.	... ...	Nil.	
me as No. 38.	... ...	Nil.	
pping movements of hands nd feet, slight spasm when oth seized. Pupils slightly ilated.	... ...	Nil.	
ame as No. 41, but slighter.	... ...	Nil.	Very sick day following (hæmorrhage).
pils slightly dilated. ...			
ght struggling.	... ...	Feeling of weakness.	
... ...	Hysteria.		
... ...	... ...	Nil.	
pils dilated after facepiece moved.	... ...	Nil.	
pils not dilated, screaming.	... ...	Nil.	Probably felt.
eaming.	... ...	Nil.	Did not feel.
aming.	... ...	... ...	Stout girl.

No.	Sex. Age.	Quantity.	Method.	Time.		Phenomena	
				Induction.	Anæsthesia.	Respiration.	Circulation.
51	F 39	3ss. added to No. 50.	As Case 48.	...	35 secs.	Slight stertor, groaning all time.	Pulse failing. ...
52	F 32	3ss. added to No. 51.	As Case 48.	...	40 secs.	Groaning and muttering after first few inspirations.	
53	F 24	3ss. added to No. 52.	As Case 48.	85 secs.	30 secs.	Slight stertor, groaning and muttering all time.	
54	F 20	3ss. added to No. 53.	As Case 48.	...	40 secs.	... ...	... ...
55	F 26	3ss. added to No. 54.	As Case 48.	55 secs.	30 secs.	... ...	... ...
56	M 15	3ss. added to No. 55.	As Case 48.	85 secs.	20 secs.	... ...	... ...
57	M 11	3ss. added to No. 56.	As Case 48.	80 secs.	25 secs.	Slight stertor.	... ...
58	F 21	3i.	As Case 8, Merck's drug.	...	...	... Fair. ...	... ...
59	F 20	3ss. added to No. 58.	As Case 8, English drug.	...	...	... Fair. ...	... ...
60	F 21	3ss. added to No. 59.	As Case 59.	...	...	... .	... ...
61	F 12	3ss. added to No. 60.	Ormsby, much air, English drug.	...	...	... Fair. ...	... ...
62	F 20	3ss. added to No. 61.	As Case 8, Merck's drug.	...	...	... ...	... ...
63	F 19	3i.	As Case 62.	...	...	Fair, slight stertor.	... ...
64	F 43	3ss. added to No. 63.	Ormsby, no air. Merck's drug.	...	...	Shallow.	
65	F 24	3iss.	As Case 64.	...	...	... ...	... ...
66	F 25	3ss. added to No. 65.	As Case 64.	...	...	... ...	... ...
67	F 33	3ss. added to No. 66.	As Case 64.	...	...	... ...	... ...
68	F 22	3ss. added to No. 67.	As Case 64.	...	...	... ...	... ...
69	F 24	3iss.	As Case 64.	...	...	Fair; decided stertor.	... ...
70	F 34	3ss. added to No. 69.	As Case 64.	...	...	Fair; stertor. ...	... ...
71	F 31	3ss. added to No. 70.	As Case 64.	..	...	... Stertor. ...	... ...
72	F 23	3ss. added to No. 71.	As Case 64.	...	...	... Stertor. ...	... ...
73	F 22	3ss. added to No. 72.	As Case 64.	...	...	... Stertor. ...	Primary flushing, pul slowed and improved tone.

Muscular and Nervous.	After-Effects. Immediate.	After-Effects. Remote.	Remarks.
... ...	... ...	Sleepy and languid.	
light excitement.	Hysteria.	Nil.	
Movements of hands and arms directly tooth seized.	... ...	Very ill.	Did not feel.
rief excitement.	... ...	... ...	
upils not dilated.	... ...	... ...	
... ...	... ...	... ...	[II., p. 128. Pulse tracing taken : Fig. *A* Immediately before inhalation. *a* At height of anæsthesia.
... ...	Hysteria.	... ...	Same patient as 54.
... ...	Screaming and Hysterical.	Prostration and Headache.	
creaming.	... ...	... ...	Did not feel. Props slipped.
... ...	... ...	Nil.	
... ...	... ...	... ...	Same patient as 49.
upils not dilated.	... ...	Nil.	Some time coming round. Pulse tracing taken: Fig. III., p. 129. *B* Immediately before inhalation. *b* At height of anæsthesia.
... ...	... ...	... ...	Took badly. Pulse tracing taken : Fig. IV., p. 129. *C* Immediately before inhalation. *c* At height of anæsthesia.
light spasm. Pupils not dilated.	... ...	Pain in neck.	
... ...	... ...	Nil.	
ome spasm towards end. Pupils unaffected.	Hysteria. Fainted.	Very weak.	Tall anæmic girl, subject to fainting attacks.
... ...	... ...	Dazed.	
... ...	Hysteria.	Nil.	
... ...	... ...	Nil.	
... ...	... ...	... ...	Typical.

No.	Sex. Age.	Quantity.	Method.	Time.		Phenomena.	
				Induction.	Anæsthesia.	Respiration.	Circulation.
74	F 19	3ss. added to No. 73.	As Case 64.	...	...	... ...	... ...
75	F 28	3iss.	As Case 64.	...	...	Fair; slight stertor.	Flushing of face. ... ...
76	M 49	3iss.	As Case 64.	...	...	Slight stertor.	Temporal pulse became irregular and weaker.
77	M 38	3iss.	As Case 64.	...	...	Fair; then shallow, then deeper. Stertor.	Pulse became irregular. ...
78	M 38	3iss.	As Case 64.	...	...	Groaning all time.	... ...
79	M 24	3iss.	As Case 64.	...	...	Fair; stertor. ...	Pulse slowed, quite regular, tone improved.
80	M 43	3iss.	As Case 64.	...	...	Restrained, irregular; marked stertor.	Pulse slowed and slightly softer.
81	M 19	3iss.	As Case 64.	...	50 secs.	Fair; stertor early.	Pulse good all time. ...
82	M 22	3iss.	As Case 64.	...	...	Fair, then quickened.	Pulse quickened. ... ...
83	M 23	3iss.	As Case 64.	...	...	Fair; slight stertor.	... ...
84	F 24	3i added to No. 83.	As Case 64.				
85	M 32	3iss.	As Case 64.	...	...	Fair; slowed, stertor.	Primary flushing, followed by pallor, pulse slowed, tone improved.
86	M 22	3i.	As Case 64.	...	...	At first rapid, then slowed; slight stertor.	Pulse slowed, quality retained, pallor after face-piece removed.
87	F 30	3i.	As Case 64.	...	...	Fair; no stertor.	Pulse very variable. ...
88	F 36	3iss.	As Case 64.	...	60 secs.	... Fair. ...	... ...
89	F 22	3i added to No. 88.	As Case 64.	...	55 secs.	... Fair. ...	... ...
90	F 19	3iss.	Ormsby, a very little air towards end.	...	...	... Fair.	
91	M 27	3i added to No. 90.	As Case 90.	...	...	... Fair. ...	Pulse became small and slightly irregular.
92	F 21	3i added to No. 91.	As Case 90.	...	...	... Fair. ...	... ...
93	F 21	3iss.	As Case 90.	105 secs.	55 secs.	Fair; slight snoring, stertor.	Pulse became irregular, then slowed and improved in tone.
94	M 23	3i added to No. 93.	As Case 90.	...	50 secs.	Fair; slight snoring.	... ...

Muscular and Nervous.	After-Effects. Immediate.	After-Effects. Remote.	Remarks.
... ...	Excitement.		
Pupils dilated.			
... ...	Dazed.	... ...	'Bus driver (?) alcoholic.
Slight spasm of extensors of fingers.	... ...	Nil.	Labourer.
Slight spasm of fingers. ...	... ...	... ...	Same patient as No. 77.
Pupils unaffected.	... ...	... ...	Labourer.
Very slight struggles. Pupils not affected.	Dazed.	... ...	Artisan, tall and neurotic, long recovery.
Slight spasm after face-piece removed. Pupils slightly dilated.	Dazed.	... ...	Labourer, slow recovery.
... ...	Dazed.	... ...	Labourer.
Rhythmic movements of feet.	Excited.	... ...	Pulse tracing taken : Fig. V., p. 130. *D* Immediately before inhalation. *d* At height of anæsthesia.
Twitching of hands and legs, flaccidity. Very slight excitement.	... ...	... ...	Railway clerk, neurotic.
Conjunctivæ very slightly congested, pupils slightly dilated.	Dazed.	... ...	Robust man.
Rhythmic movements of hands after first few inspirations, moved arms during extraction. Conjunctivæ insensible, pupils very slightly dilated.			
Conjunctivæ insensitive. ...	Hysteria.		
Conjunctivæ insensitive. ...	Hysteria.		
Rhythmic movements of fingers. Conjunctivæ not quite insensitive.	Slight excitement.		
... ...	Nausea.	... ...	Pulse tracing taken : Fig. VI., p. 130. *E* Immediately before inhalation. *e* At height of anæsthesia.
Pupils dilated after face-piece removed.	Hysteria.		
Pupils not dilated.	... ...	... ...	A labourer. Pulse tracing taken : Fig. VII., p. 131. *F* Immediately before inhalation. *f* At height of anæsthesia. *f'* After recovery.

APPENDIX B.

Bibliography.

Nunneley's first experiments with bromide of ethyl are related in the course of an account given by him of his elaborate investigations into the properties and action of various anæsthetic agents; this account was published in the *Transactions of the Provincial Medical and Surgical Association*, 1849, pp. 206 and 325. His second communication on the subject was made to the British Medical Association at their meeting in 1865, and appears in the *British Medical Journal*, 1865, vol. ii., p. 192. For about fifteen years, with the exception of casual and brief annotations, nothing of importance appears to have been written, and the literature of bromide of ethyl may, therefore, be said practically to date from 1880.

The following list comprises the most important communications that have been made on the subject since 1880. I have myself verified the correctness of the references in the majority of instances; in some few cases, however, (distinguished thus *), this has not been possible, and my information is but second-hand.

Bourneville and D'Olier. *Comptes Rendus Société de Biologie*, Paris, 1880, p. 525.

Chisholm. *Maryland Medical Journal*, December 5th, 1880; * quoted nearly in extenso from a French source in *British Journal of Dental Science*, 1883, p. 616.

Clover. *British Medical Journal*, 1880, vol. i., p. 586.

Falk. *Therapeutische Monatschrift*, 1890, p. 463.

Greene. *Pharmaceutical Journal*, 1879-80, p. 29. An account of the preparation of the drug.

Haffter. *Correspondenz Blatt für Schweizer. Aerzte*, 1890, pp. 106, 143. Quoted in *British Medical Journal*, 1890, vol. i., p. 864.

Herz. *Internationale Klinische Rundschau*, April 15th, 1889.*

Kheifetz. *Meditzinskoïe Obozrenië*, No. 13, p. 1889.* Quoted in *British Medical Journal*, 1890, vol. i., p. 864.

LEVIS. *Philadelphia Medical Times*, 1880, p. 188. *Philadelphia Medical Times*, 1880, p. 245.

NORTON. *British Medical Journal*, 1880, vol. i., p. 735. An account of two cases.

PRICE. *St. Louis Medical Journal*, October, 1883.*

Progrès Medical. Interesting Articles, 1880, pp. 491 and 710.

RABUTEAU. *Comptes Rendus Société de Biologie*, Paris, 1880, p. 974.

REEVE. *British Medical Journal*, 1884, vol. i., p. 812.

REMINGTON. *Pharmaceutical Journal*, 1880, p. 962. An account of preparation.

RICHARDSON. *Asclepiad*, 1885, p. 264.

SCHNEIDER. *Deutsche Monatschrift für Zahnheilkunde*, 1888, vol. i., p. 373.*

SIMS. *New York Medical Record*, 1880, p. 361.

SQUIRE. *Transactions of International Medical Congress, London*, 1881, vol. i., p. 448. *British Medical Journal*, 1882, vol. i., p. 934.

SZUMAN. *Therapeutische Monatschrift*, 1888, pp. 155, 226 Quoted in *Dental Record*, 1889, p. 112.

TERILLON. *Bulletins et Memoires de la Société de Chirurgie de Paris*, 1880, pp. 198, 261, 316. Quoted in *British Journal of Dental Science*, 1880, p. 542.

TRAUB. Article reviewed by Dr. Junker in *London Medical Record* for August, 1887.

TURNBULL. *Philadelphia Medical Times*, 1880, p. 200. *Philadelphia Medical and Surgical Reporter*, January 31st, 1889 and March 6th, 1880.* *New York Medical Record*, 1880, p. 643. See also his "Artificial Anæsthesia," 2nd (English) edition, p. 65-80.

WILKINSON. *New York Medical Record*, 1880, p. 554.

WILLIAMS. *British Medical Journal*, 1884, vol. i. p. 402. Mainly bibliographical.

WOOD. *Philadelphia Medical Times*, 1880, p. 370. *Transactions International Medical Congress*, 1881, vol. i., p. 448. *British Medical Journal*, 1882, vol. ii., p. 934.

WOLFF. *American Journal of Pharmacy*, May, 1880.* Quoted in *Pharmaceutical Transactions*, 1880, p. 3.

Discussion.

The President said, in order to bring the discussion within satisfactory limits, he might ask those anæsthetists who were present to give the Society the advantage of their views first, and then he should be glad to hear the experience of any dental operators who had tried the anæsthetic.

Mr. Woodhouse Braine wished to state at the outset that he had never seen bromide of ethyl administered, but he had very carefully gone through Dr. Silk's paper, of which he had very kindly sent him an advance copy, and he confessed that he was not satisfied with the results which the drug had given. It seemed to him that in a very large number of cases the heart gave evidence of failing, and up to the present there had been a certain number of deaths traceable to its use. In his opinion exactly what could be done with this anæsthetic could also be accomplished with chloroform, but with precisely the same risk to life—a risk which did not exist when employing gas and ether. He felt sure that they were all grateful to Dr. Silk for having tried the drug, but he wished to point out that it was no new thing; it made its appearance as far back as 1849, but was given up or lost sight of until about fifteen years later, when it was brought forward again; for another period little or nothing was heard of it, and then it was once more taken up in America. It had, therefore, had two or three good trials, and Mr. Braine was of opinion that if a thing could not hold its own after three good trials it was not worth much.

Mr. G. H. Bailey thought Dr. Silk was in error in saying that bromide of ethyl had not been used in this country in dental practice. Both Mr. Clover and he (Mr. Bailey) had employed it, but had been compelled to relinquish its use owing to the very unsatisfactory results which they had obtained. Mr. Bailey read a quotation from an article by Mr.

Clover, and which appeared in Quain's "Dictionary of Medicine," in which he described its properties and uses, and finally referred to its dangerous effects upon the heart. Mr. Bailey had recently been addressing a post-graduate class upon the subject of anæsthetics, and he had been compelled to warn it against the use of the bromide of ethyl. But what had surprised the speaker was that after seeing the most alarming statements given in the last two columns of Dr. Silk's "Table of Cases," Dr. Silk had said anything save in discountenance of the anæsthetic. His results had certainly shown how dangerous it was, for hardly a single instance of a thoroughly satisfactory result appeared to have been obtained. These results tallied with Mr. Bailey's own experience, and he must remind the members that two deaths had resulted from its use. Quoting from an editorial note in the *Lancet*, Mr. Bailey said that giving nitrous oxide was now so safe as to amount almost to a simple formality, but such was not the case with bromide of ethyl, and he strongly deprecated that dentists should be taught to employ an agent so dangerous and one requiring such special and skilled administration. A constant danger with bromide of ethyl was its liability to decompose and liberate pure bromine, and to this peculiarity were to be attributed the fatal events which had followed its use. Mr. Bailey agreed with Mr. Braine when the latter spoke of chloroform giving identical results when administered in the way Dr. Silk used bromide of ethyl, but it should be remembered that way was—at least for chloroform—a most dangerous way, and was, in fact, the "closed method," air being almost excluded.

Dr. Dudley Buxton feared that in rising he was following an inclination to loquacity rather than the scientific caution which taught silence save when fresh facts were to be given, because, like his friend Mr. Braine, he had no personal experience of bromide of ethyl in dentistry; but as he possessed some knowledge of it when given in general surgery, he might really plead as an excuse for speaking, that he did not regard it as a safe plan to dissociate the account that Dr. Silk had given of the use of

bromide of ethyl in dental surgery from its use in general surgery. It seemed to him that the time limit—*i.e.*, the length of time required for the induction of anæsthesia, or the shortness of time occupied by the operation—had nothing at all to say to the amount of danger involved by this or any other anæsthetic. It had been shown years ago that the danger of the alcoholic compounds seemed to be mainly due to the haloid material—chlorine—contained in the molecule, or in this case bromine. And a close study of the alcohol and ethereal anæsthetics seemed to show that the potency was in some way closely associated with the complexity of the molecule. Starting from alcohol—itself an anæsthetic, as unhappily the streets of London showed only too often—they found that the various substitution compounds in the series gave more or less anæsthetic properties. Further, analogies between the replacing atoms in the molecule made the resulting bodies more or less allied in their properties. It appeared to Dr. Buxton, from the observations he had made, and which when more mature he hoped to place before the profession, that in bromide of ethyl they were dealing with a drug closely allied to chloroform, not only from the chemical, as would be expected from what he had said above, but also from the physiological, point of view. It had been the fashion to decry chloroform, but he was not at all one of those who had a feeling of antagonism towards it. He thought it a very valuable agent when given with a full sense of responsibility. It might seem that he was wandering from the point, but he was only doing so because he wished to point the comparison between chloroform and its analogue bromide of ethyl. Chloroform, they all knew, would produce a short or long anæsthesia in proportion to the dose employed. It was perfectly well known that a few whiffs of chloroform would produce slight anæsthesia without after-effect. On the other hand, bromide of ethyl, although possibly useful in short operations, could not be employed for long ones. It would be said, therefore, it can be used for dental operations. Yes, but in using it it must not be thought that an agent was being employed which was free from all danger, for Dr.

Buxton believed that its physiological action was such that it might any day cause death, and his opinion was borne out by the cases reported from abroad. Possibly those present were familiar with the deaths met with by Levis and Pancoast, which were from heart failure, though it was said death also followed from failure of respiration. Dr. Silk had shown that one gets heart failure in some form or another in a terribly large proportion of the cases cited, and any substance which produced heart failure ought not to be employed in operations so trivial as those carried on in dental chairs. They must admire the courage of anyone who would give bromide of ethyl a trial in dentistry, and he would conclude with the expression of his thanks to another man who had stepped into the breach, and accomplished this useful work.

Mr. Barrett asked if Dr. Silk would say if he thought it necessary that the patient should fast before taking bromide of ethyl.

Mr. W. A. Maggs said that he had operated with bromide of ethyl, and certainly the first cases were not ones which Dr. Silk would take the value of the anæsthetic from. In these the closed method with the leather cone was adopted, and the flushing, excitement, and other symptoms were exhibited. As to the period of anæsthesia, in his experience it lasted from fifty to sixty seconds, but the difficulty of telling when the patient was anæsthetic was to him considerable; he could, of course, see that the breathing was much shallower, but it was difficult to tell when the patient had had enough. Then with regard to the recovery, patients seemed very much knocked over, much as they do in chloroform, but there was no hysteria or excitement—the patients seemed to recover more gradually than with gas. He did not remember any case in which the after-effects were so serious as to necessitate any kind of treatment.

Mr. W. H. Coffin said that it would be hardly necessary to remind the members that at the International Medical Congress of 1881, no less an authority than Dr. Squire advocated the use of bromide of ethyl, and Mr. Coffin

believed, especially for the dental profession, under the impression that the effect and recovery were rapid. At the close of the paper Professor Wood of America opposed its use, and stated that in the United States it had been practically abandoned as more dangerous than chloroform without any counter-balancing advantages. Mr. Coffin had, nevertheless, operated a number of times under the drug, and was bound to say that his impressions of it were not favourable. Upon the last occasion of his use of it, the young and enthusiastic anæsthetist who administered for him said, "The beauty of it is, you never get any after-sickness;" the anæsthetist leaving soon after the operation, was probably still under the impression that sickness never ensued, but Mr. Coffin's memory of that occasion was far otherwise. Mr. Coffin called attention to the extreme interest attached to the drug from a chemical point of view on account of the simplicity of its formula, and as being so symmetrically analogous with ordinary or ethylic alcohol. Its formula might be described as the simplest haloid derivative of the saturated hydrocarbon ethane, C^2H^6, in which one atom of hydrogen was replaced by an atom of bromine. And alcohol was the corresponding derivative in which an atom of hydroxyl replaced the hydrogen atom. Upon this view ethylic alcohol might be called hydroxide of ethyl. These considerations might assist in the comparison of the physiological effects of alcohol and the bromide respectively. If he might go beyond its use as a general anæsthetic, he might say that he had a distinct recollection of his father using it some years ago for reducing irritation of the throat, laryngeal spasm and for asthmatic attacks.

Votes of Thanks.

Dr. Silk then briefly replied, and at the President's initiative the usual votes of thanks were given to the contributors of communications. The President announced that the next meeting of the Odontological Society of Great Britain would be held at 40, Leicester Square, W.C., on Monday, March 2nd, at 8 o'clock, when a paper will be read by Dr. W. Job Collins, on "Related and Associated Ocular and Dental Diseases." Casual communications by Mr. Storer Bennett, "A Case of Alveolar Abscess of Three Years' Duration, caused by the Perforation of the Side of a Root;" Mr. Ackery, "Some Cases of Eruption of Teeth in Abnormal Positions;" Dr. Scanes Spicer, "Opacity of the Antrum in Disease;" a demonstration with the electric light; Mr. David Hepburn, "A new Dental Dressing Stand." The meeting then closed.

Disderi, Photo. *Woodbury Company.*

J. SMITH TURNER,

M.R.C.S. AND L.D.S., ENG.

Odontological Society of Great Britain.

ORDINARY MONTHLY MEETING.

March 2nd, 1891.

MR. S. J. HUTCHINSON, M.R.C.S., L.D.S.,

PRESIDENT, IN THE CHAIR.

THE Minutes of the last meeting having been read and confirmed,

Messrs. H. L. ALBERT, THEODORE W. HARRIS, T. S. CARTER, having duly signed the Obligation Book, were admitted by the President members of the Society.

The nomination of Mr. BEADNELL GILL was read before the Society;

Mr. THOMAS MAUDSLEY HOWKINS, L.D.S.I., of Dunallan House, Regent Terrace, Hull, was balloted for and elected a non-resident member of the Society.

In the absence of the Librarian, Mr. STORER BENNETT announced that two donations had been made to the Library, viz.: (*a*) *Calendar of the Pharmaceutical Society of Great Britain*, 1891; (*b*) "*Verhandlungen der Deutscher Odontologischer Gesellschaft*, Band II., Heft 2, den October, 1890" (Berlin, 1891) [No. 2 of the second volume of the *Transactions of the German Odontological Society*, Oct. 15th, 1890].

The CURATOR (Mr. STORER BENNETT) stated that two upper models had been received for the Museum from Mr.

Bulkley Hughes, the first model from a patient aged forty showed two supernumerary teeth erupted in the palate behind the normal incisors, the crown of one of the teeth was cubical and the other cone-shaped. These two teeth were extracted, causing considerable hæmorrhage, and accompanied the model. The second model showed a conical crowned supernumerary tooth also erupting in the palate, in a boy aged fourteen. This tooth was likewise extracted and sent to the Museum.

Mr. Storer Bennett related a case of alveolar abscess of three years' duration caused by the perforation of the side of a root of a tooth. He said the case was interesting and instructive for various reasons, for it showed the disastrous consequences which might result from the injudicious employment of a drill for opening up a root canal, which, if it quit the normal channel, might pass completely through the wall of the tooth; and if the nature of the accident escaped recognition at the time, its subsequent detection might become a matter of the greatest difficulty, should the patient pass into the hands of another practitioner for treatment. The history of the case was somewhat detailed, extending over a period of four years, and being under the treatment of four different dental practitioners. In 1886 the patient, a young lady then fifteen years of age, had a right upper lateral incisor filled on its palatine surface. In the following year the pulp became inflamed, and a chronic abscess formed, discharging through a fistulous opening opposite the apex of the root. In 1888 a second dentist was consulted, and he, in order to cure the alveolar abscess, enlarged the root canal and filled it with gutta percha. The tooth now became acutely inflamed, and a profuse discharge of pus escaped through the gum from a second fistula opposite the buccal surface of the root, but lower down than the first one. The case was under treatment for five weeks without relief, when it was necessary for the patient to come to London, where she consulted a third dentist, who appears to have expressed himself very confidently of his ability to affect a speedy cure. By him, however, the tooth was dressed on alternate days for six

weeks when, as no improvement in the symptoms could be detected, he suggested that a consultation was desirable. This was accordingly held, when, after a very careful examination, the consultant expressed it as his opinion that the second fistula had no connection with the abscess at the apex of the root; an opinion that subsequent events—and the present specimen—proved to have been absolutely correct. In 1890 the young lady was seen by an eminent surgeon, by whom her trouble was attributed to an abscess in the antrum, a molar was therefore extracted, and the antrum opened through the socket for its relief; no pus however, escaped, and at the end of a few days the opening was allowed to close up. The discharge from the lateral incisor continuing unabated, the patient reluctantly consented to the tooth being extracted, when it was seen that in enlarging the root canal the drill had been directed too far forward and so through the buccal wall, while through the false passage so formed a piece of gutta percha protruded. The difficulty of diagnosis of course arose when the false passage being formed was plugged with gutta-percha, for then the usual signs of such an accident were masked by the perforation being blocked. Looked at aright, Mr. Bennett thought this case should impress on the profession the importance of three things :—

(*a*) The danger of employing such a drill as is capable of cutting a new channel for itself.

(*b*) The unwisdom, to use no stronger term, of too confidently expressing the opinion that we can cure a case that others have failed in, since some unlooked for obscurity may escape our observation, and

(*c*) The need of a little charity towards others who may have been unsuccessful in the treatment of cases.

Mr. J. Ackery then contributed his casual communication. He said that in bringing forward the two or three cases to which he was about to call attention, he was afraid he was doing so without being able to give any very distinct record. The previous history had not been well known, but this fact in itself gave the greater scope for

discussion as to the causes of the abnormalities. In the first instance, the model he wished to show was that of a lad aged fifteen or sixteen, in whom the right lower first molar had become impacted; it remaining on a lower level than the second molar. The puzzle was how a six-year-old molar could become impacted in this way. In his experience it was unique. The tooth was carious at its posterior aspect and as the patient had not got his wisdom teeth Mr. Ackery thought it best to remove the misplaced tooth. This he did, and the wisdom tooth afterwards erupted occupying very nearly the position of the second molar. Another case quite inexplicable to his mind was one which occurred in a member of his own family. The second upper molar had never come down to its true level, the first molar was tilted forward. There had never been any irregularity of the lower teeth to account for the position of the upper.

The third case was that of a medical man, in whom the second upper bicuspid tooth on the left side pointed into the sulcus. As the tooth was carious Mr. Ackery advised removal, and on this being done an unusual condition of the root was found to exist. The tooth was shown. The fourth model showed persistence of the upper temporary and permanent canine teeth on both sides, and abnormal position of both bicuspids on the left side.

Mr. David Hepburn being called upon by the President, said that he did not propose to occupy the time of the Society for more than a few moments, while he described his model of a new dental dressing stand. Very often in ordinary practice some contrivance suggested itself which proved to be a convenience, and which when used after a time became to a certain extent indispensable. The stand was designed so as to form a convenient receptacle for small quantities of drugs and dressing materials for daily use. It is provided with spirit lamp, &c., and is so arranged that its contents are contained within a small compass, and are capable of being manipulated with one hand by the operator. It consists of three tiers, reduced to the smallest possible dimensions consistent with utility,

the whole revolving by a touch of the finger or dressing forceps on a foundation stand, by which arrangement the drugs and materials may immediately be brought within easy reach. The lowest tier is represented by a series of small boxes or receptacles containing coloured discs of bibulous paper, pink and white gutta percha pellets, amadou, and also a rasp on which to strike matches. The second tier contains receptacles for, and is furnished with six small bottles of various colours, match-box, cotton wool holder, and gutta percha heater. The third tier is represented by the ordinary spirit lamp. The system suggested for "dressing" is the employment of discs of bibulous paper of different colours associated with the various drugs employed. For example, *pink* is associated with carbolic acid, and further the carbolic acid is contained in a pink bottle. Arsenic is associated with *green*. Perchloride of mercury with *blue* and so on. As the covers of the bottles work on hinges and may be easily lifted with the dressing forceps, and moreover, are neckless there is convenient access to the drugs. The gutta percha or mastic covering of the dressing may be applied also with equal cleanliness, ease and expedition. The system of coloured bottles (which of course in addition should be labelled) enables the operator immediately to recognise the whereabouts of his favourite therapeutical agents, and by the use of the coloured discs to know the nature of the dressing employed even if removed after a lapse of time.

The PRESIDENT thought the apparatus an extremely ingenious arrangement and a great practical utility. The Society was much indebted to Mr. Hepburn for bringing it forward. He would now mention that Dr. Scanes Spicer had been good enough to bring two patients for them to see, and as it would be necessary to see them in a darkened room, perhaps it would be convenient to do so at the close of the meeting. Mr. Ashley Barrett had also brought a patient, showing a case of double dislocation of the jaw, and he would call upon Mr. Barrett for his communication in connection with it.

Mr. Ashley Barrett said that the patient presented herself at the out-patient department of the London Hospital about three months ago, and complained of almost complete inability to open her jaws. There was considerable pain on the left side of the mouth in the neighbourhood of the wisdom teeth. Mr. Barrett opened the mouth under chloroform with a screw opener, finding it necessary to use only a moderate amount of force. He extracted the third molar. A certain amount of inflammation was going on round it, and in the neighbourhood of the masseter muscle. In January last the patient came again to the Hospital, and said that every time she opened her mouth the jaw clicked, and on examination the condyles of the inferior maxilla apparently slid over the corresponding eminentia articularis, and when she closed the mouth again the dislocation on both sides was reduced. She said it all but entirely prevented her eating. There was a good deal of pain, and the clicking noise produced constant headache. The points upon which Mr. Barrett said he should be glad to have the opinion of the members were, first as to the cause of the dislocation, and secondly what was the best mode of giving relief. With regard to the cause it seemed to him to be a somewhat obscure matter. On consideration he had thought three possible conditions might have caused it. The patient was a young woman of loose fibre, aged twenty-four, and complained of clicking in every joint. The right shoulder joint was liable to be dislocated, also the left knee. It occurred to him that possibly she might be affected with rheumatoid arthritis, which sometimes affects the jaw; there might be accompanied with this a growth of bone about the glenoid cavity which might be the cause of the pushing forward of the lower jaw. Mr. Barrett was not quite clear in his own mind whether complete dislocation existed. The second suggestion was that possibly, though he was not conscious of it, he might in forcibly opening the mouth have stretched the capsular ligaments. The third possible cause was that the capsular ligaments might have wasted and become very lax; the external pterygoids might also act in an incoordinate manner, and they might draw

the condyles forward. As to treatment, it occurred to him that this slipping of the jaw might be prevented by mechanical means, and for this purpose he had constructed a head-cap with bands which connected it to a chin-cap made of vulcanite, so that a constant traction might be exercised on the jaw, and he was hopeful that by continued action the condition might be improved. Further, he should mention that the patient had no front teeth, a circumstance which he proposed to utilise by making a strong metal plate with rather long upper incisors, which he hoped would prevent the jaw from sliding forward.

Mr. W. H. Coffin, in discussing Mr. Storer Bennett's case, wished to say that about a year ago a lady came to him under almost similar conditions to those described by Mr. Bennett, the only difference being that the lateral incisor root carried a pivot and an Ash's tube tooth on a gold pin. Every effort to alleviate the discharge failed, and Mr. Coffin extracted the root with the pivot and found, as he suspected, that there had been a perforation in almost the same position as in Mr. Storer Bennett's case. The gold pivot protruded about the thirty-second of an inch. After removing the pivot and making the root smooth on the outside he replanted it, and it became perfectly firm. Mr. Coffin afterwards mounted a Logan crown on it, and the case was doing perfectly well. He mentioned the case because it would encourage him in future to extract and replant a similar tooth.

Mr. F. J. Bennett, commenting upon Mr. Barrett's case, said that it scarcely would appear to be a true case of dislocation of the lower jaw. It seemed to him to be more a gliding forward movement on the condyle, and was probably due to the relaxation of the ligaments, and increased by constant repetition. Probably, if such a splint as Mr. Barrett had suggested were rigorously applied for a few months it would restore the jaw to a proper movement. In such cases he believed the explanation was that the condyle was unusually flat, and the glenoid cavity unusually shallow.

In such circumstances it was not rare to find a little forward movement of the jaw, but not a true dislocation. With regard to Mr. Ackery's first case—from his description it reminded Mr. Bennett of a case he had seen in private practice. The first lower molar was impacted between the second molar and second bicuspid. The portion of tooth exposed above the gum was of such a curious shape that Mr. Bennett thought it was an odontome, but he found on extracting it that it was an ill-formed tooth, with a short conical fang. Mr. Bennett believed it had been pointed out by Tomes and others that the relative height and position a tooth assumes is largely due to the growth of the fang, and therefore he concluded, in his own case, in consequence of the fang being much dwarfed, it had been overtaken by the second molar and bicuspid, and once being behind in the race, had been held down in position by the other teeth.

Mr. F. Newland-Pedley expressed his agreement with Mr. F. J. Bennett as to the nature of Mr. Barrett's case. He did not for a moment think it was a case of perfect dislocation. He had the pleasure to exhibit a model of the mouth of a man aged twenty-four, with inherited syphilis. When about six years of age he got necrosis in the palate and about four years afterwards he erupted a tooth.

Mr. W. H. Coffin then exhibited a paper disc, with a peculiar central perforation, the invention of Dr. Kimball, of New York, consisting of a combined slit and hole, allowing the flat head of a screw-mandril to be passed through bodily, without the necessity of completely removing the screw from the mandril.

The President then called upon Dr. Collins for his paper.

Associated and Related Ocular and Dental Diseases.

By W. Job Collins, M.D., M.S., B.Sc., F.R.C.S.

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This communication is the result of a request by my former colleague, Mr. Maggs, that I should read a paper before your Society. My work for the last ten years having been largely in ophthalmic practice, I was led to think of those points where your specialty touches mine. I am fully aware this subject has been brought to the notice of this Society in a paper communicated by Mr. Power in 1883, and which occasioned a valuable discussion. This paper was declared by one of the speakers to be "the most complete collection of facts bearing upon this important subject which had yet appeared in the English language," and by others to deal with facts hitherto little known or inadequately appreciated.

In the remarks which I offer to-night on associated and related ocular and dental diseases, I do not lay claim to be either comprehensive or dogmatic, but rather suggestive and critical. My attention was early directed to the alleged rela-

tion of dental lesions and eye diseases, chiefly by Mr. Power, whose house surgeon I was at the time he read you his paper; and I have kept myself keenly alert to discover the truth about the relationship during the eight years which have since elapsed, and during which I have been engaged in the ophthalmic practice of four or five different hospitals.

Logically, it is no easy matter to establish conclusively a causal nexus between ocular and dental diseases. Bain truly observes, "Nowhere more than in medicine may laws of causation be defeated; there is rarely such a thing as a simple cause yielding a simple effect. Hence the necessity of ascertaining whether a coincidence is more frequent than would be accounted for by chance." The elimination of such chance is sought in statistics. Thus Power says, "I have noticed that a large proportion of the children who have phlyctenular ophthalmia also have carious teeth; surely this is very suggestive of the ætiology of the affection." He states his belief in a causal connection between the two; yet on another page he recognises the ambiguity of such conclusion, owing to "the extreme frequency with which dental affections present themselves." Here, then, statistics are of little avail, and we are compelled to resort to a deductive method of proof, and invoke the aid of a judicious em-

piricism. Beyond a general notion that phlyctenulæ are herpetic, and that herpes is somehow neurotic, and if neurotic, associated somehow with dental irritation, there is probably little basis for any such idea.

On the other hand Hutchinson, from an examination of 102 cases of interstitial keratitis, was able to arrive at the induction that this disease was due to inherited syphilis, and was very frequently accompanied with a characteristic physiognomy and definite dental irregularity. The same author's demonstration* of the remarkable concomitance of laminar cataract, defective enamel, especially of the first molars, and Arlt's connection of the former with infantile convulsions, is not less suggestive of some underlying relation between ocular, dental and general nutritional aberration. Whether the chain of relationship is that mercurial powders given for the convulsions cause the dental peculiarities, while the cataract is referrible to the convulsions, and not to the mercury is, to say the least, very doubtful.

When we come to cases where far commoner and less specific dental disease exists as a possible or part cause in some lesion of the eye, we can only proceed upon known anatomical lines and proved physiological facts.

Apart from such cases as antral disease, which

* *Path. Soc. Trans.*, vol. xxvi., p. 235.

places teeth and eye in direct pathological relation, we look to the innervation of the respective organs as affording a bond of connection. Bearing in mind the destination of the whole of the second, third, fourth, sixth, and parts of the fifth and seventh cranial nerves, together with the sympathetic supply to the eye and orbital contents, eyelids and muscular appurtenances, and the associated rich innervation of the teeth by the other two large sensory divisions of the great trigeminal nerve, we cannot fail to appreciate the opportunity of intercommunication afforded. Accepting the truths which physiology teaches of reflex action, of transference, of radiation, of so-called "sympathy," we are led to expect, *à priori*, that under certain circumstances conditions must arise in which afferent impulses ascending the dental nerves shall manifest divers sensory and motor phenomena in the complex system composing the organs of vision.

There are affinities developmental, histological and general between the eyes and the teeth which must not be lost sight of when taking a broad view of the two factors whose inter action we seek to investigate.

Developmentally, an analogy by no means fanciful may be found in the fact that with the eyes, as with the teeth, an epiblastic invagination co-

operates with a vascular mesoblastic intrusion in the genesis of the organ. A liability to sympathic tendencies and lesions may thus be laid at the outset. The connecting link of non-vascularity of the dentine and enamel and cornea and lens—a peculiarity shared by the other epidermal appendages, such as skin, nails, hair, scales and feathers—is worthy of remark. The correspondence of the two sets of phenomena may be less true in point of time than in essence, and in their later life-histories there is little of analogy between the cyclic changes of the two dentitions and the age changes which eventuate within the eyes.

No doubt it would be possible, though hardly profitable, to discuss my subject by proceeding *seriatim* through the twenty-two pages, ninety-eight genera (to say nothing of species) of diseases of the eye, and the seven pages, thirty-seven genera (to say nothing of species) of diseases of the teeth set forth in the revised nomenclature by the Royal College of Physicians; and then, by the aid of catalogues and indexes, and the ransacking of medical reports and transactions, to cite recorded cases of alleged inter-dependence of every one of one series with some one or other of the other series. I respect the honour of addressing you too highly to presume upon your patience to that extent.

A more practical line of approach would be to classify all associated and related ocular and dental lesions into (1.) Those due to direct pathological sequence, of which antral abscess from dental caries and necrosis with orbital cellulitis,* or an antral tumour causing proptosis,† may be taken as a type, and (2.) Those due to indirect pathological sequence, almost necessarily nervous in its mechanism, of which certain spasmodic affections of muscles of the eye may be taken as constituting a typical group. Alongside and outside this dichotomous division would be associated tooth and eye troubles from developmental causes, diathetic causes, morbid or other selective influences excited by virtue of histological or nutritional affinity.

Following this broad outline, I shall lay before you some cases, of which I have collected notes during the past ten years, some cases recorded by others, which help to complete the exposition, choosing such only as are recorded with critical care and sufficient fulness.

Many cases of the indirect class, especially such as were recorded before the days of the ophthalmoscope, and before Donders demonstrated the pathology of concomitant squint—which

* S. Snell, *Trans. Ophth. Soc.*, vol. x., p. 51.

† Mr. Lloyd Williams' case, *Trans. Odont. Soc. of Great Britain*, vol. xxii., No. 2, p. 49.

means before the early sixties—are of little value. Some are truly miraculous, and may be regarded as apocryphal. Some recorded as reflex amaurosis may be more reasonably regarded as coming under the first class of direct inflammatory extension. The case which Sir Wm. Lawrence,* in his "Diseases of the Eye" and Mackenzie, in his large work, quote from Galenzowski, and which Mr. Power told you he considered to be the most brilliant and complete on record of reflex amaurosis from irritation of dental branches of the fifth, may be a case in point. It was that of a man aged thirty, in whom a splinter of wood had perforated the fang of the first left upper molar, which was carious; swelling and pain of the cheek of that side occurred, and later on mydriasis and blindness, which is said to have been complete; this lasted a twelvemonth, when the cause was detected by Galenzowski and the tooth with splinter removed, and restoration of sight quickly ensued. There is history in this case of repeated discharge of spoonfuls of pus in the neighbourhood of lower eyelid, probably from empyema of the antrum, with necrosis of the orbital plate. Galenzowski, who relates the case (*Archives Générales de Méd.*, tom. xxiii., 1830) seems to admit this,

* Lawrence, "Treatise on Diseases of the Eye," 1854, p. 616.

but concludes from the case that the fifth nerve (as Magendie taught) participates in vision and supplies motor power to the iris! Mackenzie,* who, in citing the case, magnifies the intruding splinter from three lines to three inches, puts it down apparently as reflex retinal congestion. The possible effect of a orbital cellulitis directly upon the optic nerve and the striking and rapid improvement of sight after evacuation of inflammatory effusion is well shown in a case recorded by Mr. Critchett in *Ophthalmological Transactions*, vol. vi., p. 155, to which I shall again allude.

I would remark here that, notwithstanding a fairly abundant literature of a not very precise or definite sort, rather of what may be termed the "fluffy" order, cases of definite ocular disease for which a dental cause can be satisfactorily established are very decidedly rare. I have searched the ten extant volumes of the Ophthalmological Society in vain for a clear case of the kind I class in my second group. I find a case of fatal orbital cellulitis resulting from periodontitis and necrosis of the jaw.† I find associated neuralgia or anæsthesia of the fifth, with ocular troubles (vol. viii., p. 254; vol. v., 193), and a reference to a possible dental cause of herpes

* "Diseases of the Eye," 1854, p. 1078.

† Vol. x., p. 54.

facialis (vol. vi., p. 400); but no reflex amaurosis, no phlyctenular ophthalmia, no glaucoma, no ophthalmoplegia, no failure of accommodation attributed with any assurance or proof to dental lesion.

Now Mr. Power's comprehensive paper,* which laid under contribution most of the available literature on the subject up to that date, yet only contained two detailed cases which had come within the author's own experience. One was a young woman with neuro-paralytic ulcer of the cornea, who was in St. Bartholomew's Hospital when I was house surgeon, and of which I took full notes; she had corneal anæsthesia, and ulceration with hypopyon, and though it is true there was some improvement after taking out some teeth, yet the eye subsequently had to be abscised. The other case was one of double glaucoma, in which a cystoid cicatrix followed each iridectomy, and both eyes were lost. She had had toothache, "and an abscess was always found to exist at the root." I do not gather that Mr. Power either suspected or asserts dental cause in this case, nor does our extending knowledge of the pathology of glaucoma suggest it as likely. Indeed, Mr. Priestley Smith, by measuring the tension of the eye in cases of toothache at the Dental Hospital, found no reason for thinking

* *Trans. Odont. Soc.*, vol. xvi., 1884, pp. 11-56.

that toothache affected ocular tension, and though his observations were but few, yet there seems good ground for his conclusion "that the part played by ordinary forms of facial neuralgia in glaucoma is not of primary importance."†

In the full and valuable discussion which followed Mr. Power's paper, I can only find records of eight cases of oculo-dental lesion contributed by the sixteen speakers. Mr. Smith Turner related a case of amaurosis from antral abscess. Mr. Charters White mentioned a case of keratitis with a carious bicuspid; Mr. Coleman amaurosis from pivoting a left upper central, and added conjunctivitis was the commonest ophthalmic trouble resulting from dental irritation. The amaurosis case appears to be the same one referred to on page 21, vol. xix., of the *Odontological Society's Transactions*, where it is stated by Mr. F. J. Bennett, on the authority of Mr. Lawson, that the ocular trouble was iritis and in no way due to reflex dental irritation. That conjunctivitis is the commonest ocular affection associated with diseased teeth I have no doubt, for it is the commonest ocular disease, and carious teeth being common too, it is not uncommon to find the two commonplaces in the same person; but surely coincidence and not causation is responsible for such concurrence. Mr. Macna-

† "Glaucoma," 1879, p. 10.

mara, an ophthalmic surgeon of large experience both in this country and in India, could not say that he had ever met with disease of the eye due to dental irritation.

Mr. Spence Bate related a case of neuralgia in the eye relieved by the removal of carious upper molars. Mr. Gibbons told of a case of amaurosis "most marvellously improved" after removal of teeth with exostosis. Mr. A. Coleman had seen a case of malignant disease of antrum accompanied by toothache and failing sight. Mr. C. Tomes had himself experienced supra-orbital neuralgia and appearance as of "looking through running water," coincident with aching of some upper stumps and cured by their extraction. A possible explanation of this would be a radiation through superior dental to supra-orbital and lacrimal branches of fifth. Mr. S. J. Hutchinson referred to a case of lagophthalmos in a lady who had disease of molars on same side. From a subsequent report (vol. xviii., p. 7), we learn improvement followed the removal of the upper first molar, which had been imperfectly stopped. Reflex irritation of the third nerve was here diagnosed, though in the absence of spasm of any of the other four muscles supplied by this nerve, and from the description of the case, I would suggest that spasm of the muscle of Müller, the unstriped fibres of the orbit supplied by the sympathetic, is possibly a more likely explanation.

Dental surgeons are evidently on the alert for cases of the kind of which I am speaking, yet the records in your *Transactions* are few and far between.

Mr. Henry Sewill, the same night as Mr. Power's paper,* related a most interesting case, which was the only case of the kind he had seen, and which he reproduces in his work on "Dental Surgery." It was a case of spasm of the orbicularis, neuralgia, and cataract, apparently due to tender, carious and much neglected teeth on the same side. Appropriate treatment of the teeth cured the spasm and neuralgia, but of course not the cataract.

A similar case of facial spasm, with closure of the lids and neuralgia, due to caries, with abscess of the upper molars of same side, is recorded by Mr. W. C. Boyd Wallis, in vol. xviii., p. 173, of *Odontological Society's Transactions.*

On Dec. 6, 1886, Mr. Hern communicated to this Society† a case which I sent to him from Mr. Lawson's out-patients at Moorfields, in which I suspected that severe localised supra-orbital neuralgia, and possibly the diplopia which was present, were due to carious upper molars of the same side. The removal of the second and stopping of the third molar cured the neuralgia,

* *Trans. Odont. Soc.*, vol. xvi., p. 8.

† *Trans. Odont. Soc.*, vol. xix., p. 18.

though the diplopia continued when looking down two months afterwards.

Mr. Newland-Pedley, speaking on this case, wisely cautioned against too great eagerness to trace "amaurosis" to bad teeth, relating a case in which such relation was suspected, but which proved on investigation to be due to malingering, the sight being excellent. I have known several such, even in young persons, where the assertion of blindness of one eye was as obstinately alleged as it was distinctly disproved. No doubt in pre-ophthalmoscopic and less critical days such cases would pass as "amaurosis," which then meant little else than that patient and oculist alike saw nothing, and in which the moral effect of extraction without an anæsthetic no doubt produced very rapid and startling cures.

I have not found in your *Transactions* of recent years any further cases bearing upon my subject, although the valuable communication by Dr. Ferrier "On some Relations of the Fifth Cranial Nerve," viewed in the light of Gaskell's research, suggests some of the paths of inter-communication by reflexion and radiation.

In the discussion which the pathology of sympathetic ophthalmia has occasioned it has been recognised that a nerve, besides establishing a conductive relationship between parts, may also by virtue of its lymphatic sheath, or possibly its

more essential structure, afford a path for the propagation of an inflammatory process, whether we consider this of bacterial origin or not. The other theory of sympathy, viz., an identity of action towards some selective morbid poison administered to like parts, is less applicable to the subject in hand unless indeed the "rachitic" and syphilitic teeth on the one hand, and cataract and keratitis on the other, own some such subtle link.

Dealing first with cases of ocular troubles from direct pathological sequence starting from dental causes I may quote the following from my note books:—

Edith C., aged six, with irregular carious primary molars, and ulceration and necrosis of alveolus of the superior maxilla, suffered from what was called erysipelas of that side of the face, with much swelling, proptosis of the globe and chemosis of conjunctiva; there was said to be dimness of vision, but no neuritis was observed. An incision in the orbit through the lower eyelid let out ʒi. of pus, and the symptoms rapidly subsided. I have notes of two similar cases; in one the pus was intensely fœtid; in the other necrosis of the margin of the orbit followed, and some ectropion from adhesion to bone resulted, and required operation. A fourth case, in a woman aged twenty-three, was complicated with syphilis and gummatous nodes within the orbit and necrosis of

superior maxilla, neuro-retinitis resulted with complete optic atrophy. Salter* relates a similar case in which the floor of the orbital with the infra-orbital canal came away as a sequestrum. Pollock, Brück† and Gaine‡ have also recorded instances of amaurosis from orbital cellulitis, arising from antral abscess or periodontitis and maxillary periostitis secondary to carious teeth. Snell has published three cases recently, one of which terminated fatally. Critchett had a somewhat similar case in which there was great proptosis, free incisions only evacuated serum but gave great relief, and vision, which at one time was quite lost, completely returned; the other eye went through something like a sympathetic iritis. A year later another attack threatened, but extraction of a painful tooth appeared to cure it, then for the first time it was discovered that the patient, a girl aged sixteen, still had eleven of her second upper set still uncut.

Tumours, innocent and malignant, involving the antrum, and osseous growths in leontiasis ossium, of which I have noted two cases, may occasion ocular and orbital neuralgia, displacement of the globe and diplopia, and even optic atrophy.

A case I watched with close interest may

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* Salter, "Dental Pathology and Surgery," 1874, p. 273.

† *Annales d'Oculistiques*, 1856.

‡ *British Medical Journal*, part cclxi., p. 683.

serve as a transitional one to the indirect group. J. G., aged fifty-eight, suffered intense trigeminal neuralgia on the right side. Yet on testing it was found he had anæsthesia of all the parts supplied by the three sensory trunks of the fifth, including the eye, nose and mouth. There was no conjunctivitis, the pupil dilated to nearly twice the size of the fellow; the lens exhibited a diffuse nuclear cataract; the cornea, though quite anæsthetic, was perfectly clear, and remained so for some months. He had some carious stumps on the right side which were extracted by my then colleague, Mr. Maggs, without pain or benefit. Later the cornea clouded, and there were the appearances of neuro-paralytic destruction of the globe. The pain was markedly relieved by stretching the superior maxillary nerve, which I performed without an anæsthetic. Later I excised the right eye, also without an anæsthetic and without the least pain. There was no palsy of the motor portion of the fifth. I diagnosed a lesion in the Gasserian ganglion, or nuclear. I cite the case as showing the projection of pain at some distance from the lesion, and a probable relation between an irritative lesion of the fifth and cataract, as well as the more recognised corneal troubles. This case lends support to the one of Mr. Sewill's in which neuralgic blepharospasm

and cataract resulted apparently from irritation of the superior dental nerve.

I have notes of several cases of tonic trismus from spasm of the masseter and temporals due to imbedded wisdoms; this is a well-recognised reflex spasm, I believe, but I refer to it as helping to elucidate orbicular spasms from dental irritation. Irritation of sensory branches of the fifth may occasion either radiation of neuralgic pains to other branches of the same cranial nerve, as in localised supra-orbital neuralgia in Charles H., whom I sent to Mr. Hern for extraction of offending upper molars, or so-called reflex spasm, when motor branches of the same nerve are affected, causing spastic contraction of the temporals and masseters. It is only a short step from this to facial spasm, or spasm of the external rectus, the seventh and sixth nuclei being in close company with the motor root of the fifth in the pons Varolii.

Amelia D., aged sixty, had intense tonic spasm of the left orbicularis palpebrarum, with clonic exacerbations, which also partly involved the other muscles of that side. I found a painful carious canine, pressure upon which was acutely tender, and intensified the spasms. I advised removal, but regret she did not return to report the result. Mr. Boyd Wallis' case reported in vol. xviii. of your *Transactions*, p. 173, appears to be of the

same class as this. I have seen at least six or seven such cases, and have for some years pointed out the dental causation of blepharospasm.

Emma Shaw, aged twenty-five, complained in March, 1885, that for six months the right upper eyelid had been retracted, showing the sclera above the cornea. The eye could be closed easily, but in ordinary states a peculiar staring appearance resulted. This she dated very emphatically from the extraction of some upper teeth of the same side, which occasioned great suffering. There was slight enlargement of right lobe of the thyroid, and I was inclined to regard the symptoms as due to irritation of the cervical sympathetic, which supplies the muscle of Müller, contraction of which (as we may see in the cocainised eye), produces lagophthalmos. Mr. S. J. Hutchinson's case, which I have referred to, seems to me a parallel case.

I have never seen a case of glaucoma, acute or chronic, which appeared to be in any way caused by disease of the teeth; though of course neuralgia of the head and cheek is common enough in such cases. I remember a curious case of intense supra-orbital neuralgia which was puzzling; later, however, the neuralgia gave way to total anæsthesia over the area of distribution of the supra-orbital nerve. On deep pressure a lump

was felt, evidently involving the supra-orbital nerve trunk; this was removed, was as large as an almond, and was composed of granulation tissue; there was a history of syphilis, and it was possibly a node.

I have paid a good deal of attention to failure of the accommodation, and, notwithstanding the statements of H. Schmidt, I much doubt whether dental neuralgia has any other effect in this direction than that of general depression, and consequently, as with so many other depleting causes, as blood losses, the puerperal state, hyper-lactation, convalescence from exhausting fevers, in a measure restricts the range of accommodation. In sixteen persons suffering from toothache tested by Priestley Smith, fifteen had no anomaly of accommodation.

Nor do I think paralytic affections of the external or internal muscles of the eye or lids are often, if ever, traceable to dental disease. A reflex paralysis presents some physiological difficulties, and a reference to "inhibition," which seems to imply interference with some tonically exerted motor influence, does not elucidate the matter to my mind.

I also must confess to scepticism as to the satisfactory demonstration of cases of reflex amaurosis arising from irritation of the dental nerves, apart from direct extension of inflamma-

tion through the maxilla. Such cases become more frequent in literature as we recede into pre-ophthalmoscopic and less critical times, and become rarer and seem to disappear when they are most vigilantly and critically inquired for. The deep origins of the optic nerve, though not precisely determined, would appear to be far removed from the fifth, and the path of such reflex amaurosis becomes proportionately circuitous and improbable.

Of associated ocular and dental lesions, such as keratitis and notched teeth, and lamellar cataract and "rachitic" teeth, every ophthalmic surgeon has abundant instances at hand. I would here remark, however, that it is curious to notice how often many who should know better appear to confound the triple denticles which the permanent incisors exhibit normally when first cut, and which often remain some years before they are ground down, with the Hutchinsonian notched teeth of hereditary syphilis. It is, possibly, by the defective enamel of the central denticle causing this to be broken away that the notched appearance results, and I exhibit a photograph which serves, I think, to illustrate this process.

I regret that this paper has grown to a length which I did not intend; I regret that it is open to the objection of being deficient in constructive-

ness; I am aware that while some regard all oculo-dental disorders with a wholesome scepticism, others are apt to concede to them undue importance. I have attempted to decide justly between such extremes; I am led to emphasize the importance of orbital and ocular troubles with direct pathological relation to dental diseases; to relegate to a less proven category reflex amauroses and the like while recognising the undoubted existence of certain reflex spasms and radiated neuralgiæ, which oculists must look to the dentists to explain and cure.

Discussion.

The President said with reference to the paper which Dr. Collins had just read, he was sure he was only expressing the unanimous feeling in thanking him for his extremely valuable contribution. If this iconoclastic paper had smashed their idols they must accept their fate and not so hastily jump at conclusions, which some appeared to have done, he (the President) amongst the number.

Mr. J. F. Bennett said with reference to the case alluded to by Dr. Collins, and which occurred whilst Mr. Bennett was a student at the Middlesex Hospital, that it caused a good deal of interest at the time, being supposed to be an example of reflex amaurosis of dental origin. The patient whilst having a lateral tooth pivoted, suffered pain and loss of vision in the corresponding eye. Mr. Coleman, who was the dental surgeon under whom she was admitted, and who described the case at the Odontological Society, was of opinion that the pivoted tooth was the cause of the amaurosis. The patient was also seen by Mr. Lawson at the Middlesex Hospital, and he held the view that the affection of vision was in no way of dental origin, but was simply due to iritis. As Mr. Lawson was the only ophthalmic surgeon consulted, Mr. Bennett had always felt it his duty to point out this fact whenever the case was described as an example of the connection between amaurosis and dental trouble.

Mr. Albert mentioned, as illustrating the difficulty of tracing the relation between cause and effect, the case of a little child of his acquaintance, aged about seven or ten, suffering from ulceration of the cornea. She was taken to one of the first oculists in London, and he treated her in the orthodox way. After three or four weeks, as the ulceration did not clear up, she consulted Mr. Power, who attributed the lesion to a temporary molar, this was extracted, and the ulceration disappeared.

Mr. C. S. Tomes wished to say one word about a case Dr. Collins had alluded to seen by Mr. Critchett—a case of repeated attacks of cellulitis and coincident peculiar condition of the mouth. It was a remarkable case; the patient was very bad indeed, and seemed almost to be dying. There never was any suppuration, only serum. The teeth were very stunted for a girl, and there were very few permanent teeth. Those that she had were very stunted, pointed, peg-like sort of teeth with hardly any enamel and they were erupted to a very small extent only. But on no occasion upon which he saw the patient was there any inflammation about the necks of the teeth, though he did not see her quite in the first instance. Some of the teeth when they were removed were sound. The recurrence of the cellulitis and the dental peculiarities did not suggest cause and effect, but rather concomitant conditions. He could not in his own mind connect the condition as cause and effect, nor could he think of any case like it. But there they were, the very stunted teeth cut long after the normal period and at long intervals. It did occur that cellulitis was coincident with the cutting of the teeth. But there was no abscess nor any inflammatory condition.

Mr. W. A. Hunt remembered being present when Mr. Power read his most interesting paper. It was a paper which produced an impression of suspicion that there was a connection between conditions of the eye and of the teeth. He thought Dr. Collins' sceptical paper would induce the dental profession to examine very carefully the evidence brought forward in support of any supposed connection between diseases of the eye and teeth. Dr. Collins' paper had been read in post-ophthalmoscopic, not pre-ophthalmoscopic times, and Mr. Hunt thought that there existed now more than ever a very strong suspicion of the connection between certain dental and ophthalmic conditions. They might not have all the evidence that Dr. Collins required, but, as he said eight years ago, he hoped that careful notes would be taken of any cases affording grounds for supporting a relation between the one and the other, so that the details might give something definite, and no mere

hypothesis to work upon. He believed, and he was speaking from his own experience, that there was a connection between certain diseases of the eye and teeth. When surgeons were found removing one eye lest the other might be affected; when constitutional and local disturbances were shown to be related to each other, he could not help thinking that there might be a connection between functional disturbance of the eye and diseases of the teeth.

Mr. F. J. Colyer wished to mention a case of slight corneal ulcer, treated by Mr. Power, at the Westminster Ophthalmic Hospital, with success. In the temporary molar, there was a fig-pip which was pressing on the exposed nerve. On removal of the tooth the corneal lesion got well.

Mr. Morton Smale thought that dentists were a little inclined sometimes to jump at hasty conclusions, and that they should therefore be very much indebted to Dr. Collins for breaking up some of their idols. After Mr. Power's paper, Mr. Smale began to think he had been very neglectful in failing to observe related conditions between the eye and teeth. Shortly after, a colleague at the Westminster Hospital sent him a case of glaucoma in which there were some decayed stumps on the side of the glaucoma, of which he thought they might probably be the cause. After Mr. Power's paper, Mr. Smale thought so too, and he accordingly removed the stumps. Things went on very nicely indeed for about a year, when he saw the patient again, and congratulated him on the cure of the glaucoma; he had hardly done so when the glaucoma recurred. This case had hardly left him when an almost similar case was sent him by a fellow student who thought the glaucoma might be due to the decayed teeth, but in spite of the removal of these teeth, and of putting the mouth in good order, the glaucoma continued, and the patient had finally to be operated upon.

Mr. Paterson said Dr. Collins had alluded to conjunctivitis and lacrimation, but he had not supported his position by quoting any cases. Mr. Paterson desired therefore to supplement the paper. The first case he would mention was that of an upper canine which was carious and had been neglected; the pulp had died, and the stump only

remained. Several abscesses had formed from time to time and sinuses were left on the gum. Lacrimation afterwards developed in the eye on the same side, but immediately disappeared on the extraction of the tooth. This, Mr. Paterson thought, was a case of connection between affection of the branches of the fifth nerve supplying the eye and teeth ; and possibly might be accounted for by the spreading of inflammation along the sheaths of the nerves, with that proliferation and development of nuclei towards the surface, which was mentioned by Mr. Power in his paper read before the Odontological Society. Another case was that of two supernumerary teeth of bicuspid-like form, in position immediately in front of the two upper central incisors. Both teeth were carious and one abscessed, with much inflammation of the surrounding tissues. Lacrimation of both eyes was present, and also several small phylectenules on the corneæ. The removal of the teeth was attended immediately with the same satisfactory result. Mr. Paterson desired to point out that the ophthalmic surgeons ought not to blame the dental profession for any want of evidence. Oculists sent cases to dentists for treatment, but after leaving the dentist and going back to the oculist, these cases, if they got well, were never heard of again unless the dentist actively followed them up. He appealed to ophthalmic surgeons to report to dental surgeons the results of dental treatment upon their cases, and thereby afford better opportunities for studying the whole question of the connection of the diseases of the teeth with the eyes.

Dr. Job W. Collins having briefly replied, Dr. Scanes Spicer demonstrated the electric illumination of the antrum.

Dr. Scanes Spicer's patients, referred to earlier in the report, were cases of antral disease, one patient being a male and the other a female. They were seen in a darkened room, a small incandescent electric bulb lamp being placed in the closed mouth, and the light from the lamp being projected upwards by means of a reflector under it. In each case there was a remarkable difference between the right and left side of the face as to the translucency in the

antral regions. On the side where the infiltration or thickening existed there was no illumination, but on the healthy side the translucency was decided, particularly near the inner corner of the lower eyelid, which Dr. Spicer spoke of as a diagnostic point.

Votes of Thanks.

The President having put the usual votes of thanks it was announced that the next meeting would take place April 6th, 1891, at 8 p.m. Paper by Mr. A. Pearce Gould, M.S., F.R.C.S., "A Case of Tooth Plate Impacted in the Pharynx; Death from Septicæmia." Casual communications by Mr. Penfold, "Moveable Mass of Salivary Calculus, Tolerated for Three Years as an Incurable Tumour;" by Mr. W. H. Coffin, "Jaw and Dentition of the Irish Giant, Cornelius Magrath;" by Mr. Stocken, "Cases of Absorption of Permanent Teeth." The meeting then closed.

Odontological Society of Great Britain.

ORDINARY MONTHLY MEETING,

April 6th, 1891.

MR. S. J. HUTCHINSON, M.R.C.S., L.D.S.,

PRESIDENT, IN THE CHAIR.

THE Minutes of the last meeting having been read and confirmed,

The PRESIDENT stated that on the recommendation of the Council he nominated Dr. HORATIO C. MERIAM, of Salem, Mass., U.S.A., for Corresponding Membership.

Dr. A. W. W. BAKER and Mr. J. H. BADCOCK, having signed the Obligation Book, were admitted to Membership by the President.

Messrs. CHARLES ALEXANDER CLARK, L.D.S., of 7, London Road, Forest Hill, S.E.; and STEPHEN ARTHUR COXON, L.D.S.I., of 4, York Road, Wisbech; and VERNON KNOWLES, L.D.S., of London Road, Reading, were balloted for and duly elected members.

The LIBRARIAN (Mr. ASHLEY GIBBINGS) reported that Mr. J. Worsley had presented to the Library two books, interesting from having been published nearly ninety years ago. One, "A Dissertation on Artificial Teeth," by M. Dubois de Chenant, 1804, and the other, "The Natural History of the Human Teeth," by Joseph Fox, 1803, as well as the Smithsonian Report for 1888.

The Curator (Mr. Storer Bennett) announced the presentation of two sets of models; one by Mr. Moon, of Croydon, of an exceedingly under hung bite; and one, by Mr. Biggs, of Glasgow, of cleft palate—the cleft being very large. This was specially interesting on account of the excellence of the model, the upper parts above the soft palate being particularly well defined. Mr. Biggs had assured Mr. Claude Rogers, through whom the model had been received, that it had not been touched in any way.

The President called upon Mr. Penfold for his communication.

Mr. Penfold said that the specimen of salivary calculus, which he brought before the Society's notice presented some unusual features. One was that these two masses were independent and fitting closely to one another and occupying the space between the cheek and the upper maxilla on the right side of the face, giving the patient an appearance of onesidedness, but with nothing to excite suspicion of dental abscess being the cause of it. The patient came to Mr. Penfold for relief of pain in teeth on the left side, and it was in making an examination of a carious canine that he discovered the existence of a hard substance lying between the cheek and the tooth. On enquiring as to the history of the growth, he was told not on any account to touch it as it was a tumour, which the doctors said was incurable. As nothing could be done with the mass *in situ*, he risked the danger and removed first one and then the other with the fingers—they having no attachment whatever. The patient was unable to account for the horizontal position of the second molar in the posterior portion, but it seemed probable that it had assumed that position gradually, partly in consequence of alveolar absorption and partly by the pressure exercised by the growing mass of tartar. The patient complained of no special discomfort from what in most adults would at least have been regarded as inconvenient.

The President then called upon Mr. Walter Coffin, who said that by the kindness of Prof. D. J. Cunningham, M.D., of Dublin, he exhibited photographs of the skeleton of an Irish giant, Cornelius Magrath. The skull and several bones

were exhibited on Feb. 24th last, at the Anthropological Institute, by Prof. Cunningham, who had to take them back to Ireland, but had kindly lent the photographs.

The principal point of interest, very inadequately shown by the photographs, but very striking on examining the specimen itself, was the continued growth—and in this case the ultra-gigantic growth—of the lower jaw, almost identical with the case of the living patient exhibited before the Society in 1889 by the President, Mr. Sewill, and when the Society enjoyed the advantage of the symptom being described by Mr. Jonathan Hutchinson as characteristic of a rare pathological condition called acromegaly. In this case the skull was by no means large, nor could Mr. Coffin feel satisfied that the extremities were abnormally developed, but when the mandible was properly articulated it was impossible to bring the teeth into occlusion, although the molars all bore traces of wear from mastication, probably in youth. The third molars were large. A very peculiar, and perhaps accidental or adventitious circumstance, was that the teeth purporting to be and occupying the position of the upper centrals were much smaller than the lateral incisors. Prof. Flower, whose attention was called to this by Mr. Coffin, thought that other than the proper teeth must have been substituted in preparing the specimen, but Mr. Coffin could not satisfy himself that there was evidence of such *post-mortem* implantation, and trusted that Irish members of the Society would clear up this very mysterious and interesting point. Cornelius Magrath was a native of Tipperary, born in 1736, and died in Dublin in 1760. Prof. Cunningham estimates his height at seven feet two inches only, though he enjoyed the reputation of being over eight feet.

Mr. Coffin, at the suggestion of the President, promised to obtain, if possible, a cast of the jaws for the Society.

Mr. Brunton then showed models taken from the mouths of two boys, brothers, ages eleven years and two months, and thirteen years and eleven months. The former has only the four six-year molars and two upper central incisors of the second set. There is not any appearance of the

other permanent teeth being in the jaws, while the elder of the two had only the two six-year molars and one central incisor, the left, in the upper jaw. The other central incisor had been extracted, and none other in the mouth. All the teeth of the first set were in the lower jaw and the canines and molars in the upper jaw. The teeth of the first set in both boys were much worn down. The teeth of the second set were remarkably small.

Some neat and convenient basins for mixing plaster of paris for the surgery were shown. They were made by cutting in half the toy balls found at the shops which are made of thin celluloid. Some very simple and efficient points for drying root canals made from paper, such as that used for water-colour drawings were exhibited. The paper is first boiled in bichloride of mercury one in a hundred, and when dry is cut in strips, folded, and cut in such a way as to produce a taper point of about three-quarters of an inch long with a groove running the whole length of the point. The idea was suggested from observing the probosces of insects. Some of the diptera have a proboscis which is simply a rod with a groove running the whole length, the nectar of the flowers where the proboscis is thrust in, finding its way to the mouth of the insect by capillary attraction along the groove. There are three thicknesses of the drawing paper, so that any desired size or thickness of point may be made. Drills were shown for clearing the canals in teeth, made from piano wire, in shape somewhat like the "Morey" drill, the toughness of the piano wire preventing to a great extent the breaking of the drill in the canal. Pliers for handling canal points, posts, pivots, &c., were shown. The inside of the blades were grooved in the same manner as the blades of extracting forceps.

Dr. A. W. W. Baker remarking upon Mr. Coffin's communication said that it was a very interesting one, and he should be very happy to render any assistance in his power in obtaining the desired casts.

The President then called upon Mr. A. Pearce Gould for his paper,

A Case of a Toothplate impacted in the Pharynx: Septic Empyema and Ulceration of the Duodenum: Death.

By A. Pearce Gould, M.S., F.R.C.S.

Senior Assistant Surgeon to the Middlesex Hospital.

In bringing under the notice of this Society the following case I am well aware that I am but repeating an oft-told tale, and one with which all the members of this Society are very familiar. But I venture to do so for two reasons which I hope may be deemed by you sufficient. In the first place, the case baffled me, and, painful as it is to admit, it is yet very necessary that a failure to deal successfully with such an accident as the impaction of a tooth-plate in the pharynx should be recorded. Again, the course of the case was remarkable—quite out of the common—and in the summary of cases of this nature read to this Society by Mr. Felix Weiss fourteen years ago there is no mention of such a sequel as I have to tell to-night. The patient was a married woman forty years of age, of nervous temperament, but enjoying fair general health. For some time she had worn a small vulcanite suction plate bearing two artificial teeth, the right central in-

cisor and the left second bicuspid. Last year she met with an accident, and broke off a part of the plate, and impaired the suction action, and as a consequence the plate was not firmly fixed in her mouth. On January 3rd, 1891, she was cooking potatoes, and tasted one to see if sufficiently boiled; at that moment she was startled by hearing a knocking at the door, and she immediately felt pain in her throat and difficulty of breathing; as she put it, she "felt as if she was strangled." She tried to vomit, and on putting her hand to her mouth, she discovered that her tooth-plate was gone. Her medical attendant, Dr. Robertson, was sent for, and gave her emetics, which succeeded in making her very sick, but failed to bring away the lost plate. He was also unable to seize it with his œsophagus forceps. On January 8th I was asked to see her. I found her sitting upright in bed, evidently in great distress, frequently hawking up mucus, only able to swallow liquids, especially hot brandy and water, and pointing to the region of the thyroid cartilage as the seat of her acute pain. I failed to see the plate with the laryngoscope, but owing to the extreme irritability of the pharynx, I was unable to make a satisfactory examination. I could not feel the teeth from the outside. I first passed a common umbrella-probang, but it brought nothing away. Then I passed a coin-catcher, and on with-

drawing it, it caught in the edge of the plate, which was found to be lying behind the cricoid cartilage, but I was quite unable to extract it; it was so fixed that it resisted even considerable traction; this I repeated many times. I then resorted to pharyngeal forceps, of which I had several varieties; but although I more than once seized the plate, I could not remove it. All of these attempts on my part were, of course, painful and distressing to the patient, and after I had continued them for more than an hour I felt bound to desist. I then advised that Mrs. T. should be sent into the hospital, and, accordingly, she was admitted into Middlesex Hospital under my care on January 9th. She then stated that since I left her the plate had dropped down her throat, and was lower than before. She lay in bed on her right side, and breathed with some difficulty; her temperature was 99·8°. Within an hour or two of admission she was taken to the theatre, and chloroform was administered by Mr. Fardon, the mouth was opened with a gag, and a forceps applied to the tongue.

A small gum bougie was gently passed down the œsophagus, but the plate was not felt. A whalebone probang with an ivory end, first a large one, then a small one, was also passed, but no plate could be felt. A vertebrate probe gave a similar negative result. I then tried to find

the plate with the coin-catcher and the forceps I had used the day before, but could not feel or seize it. As the plate appeared to have passed down I determined to pass a full-sized gum bougie gently on into the stomach if possible; this I did, the instrument passing seventeen inches from the teeth, *but it was not so free in the gullet as normal.* However, we came to the conclusion that the plate was probably in the stomach, and so resolved to return the patient to bed, to feed her when possible on bulky food, and wait on events. Evening temperature 101·6°.

She passed a restless night, and complained of pain in the right side. However, she took three quarters of a pint of milk through the night, and next day, January 10th, swallowed some rusk soaked in milk without any pain except in the pharynx, which was attributed to the extensive manipulation to which she had been subjected. Temperature, morning 99°; evening 100·4°.

January 11th.—She had passed a better night, and had taken liquids and soaked rusk fairly well; but she complained much of a tight pain across the lower part of the right chest, especially at the level of the fifth rib within the nipple line. My colleague, Dr. Finlay, saw her with me, and his examination revealed impaired resonance over the lower third of the right back. At the extreme base behind, the breath-sounds were scarcely

audible, bronchial in character, and distant; towards the upper limit of the impaired resonance the voice-sounds were of nasal quality. In front the resonance was impaired below the third rib. The heart's impulse was best felt just inside left nipple line; it was accompanied by a thrill, and there was a rough præsystolic and a short blowing systolic murmur audible at the apex. Pleuritic effusion was diagnosed. She was ordered oatmeal porridge, arrowroot, and a little suet pudding, which she took. In the afternoon her breathing became very painful, and still worse in the evening; a morphia injection was given. At 11 p.m., the pain still being severe, I ordered two leeches to be applied to the chest, which gave great relief, and then after another morphia injection she had a good night, and took three-quarters of a pint of milk. Temperature, morning 100·4°; evening 102°.

January 12th.—This morning she took a cupful of porridge. Dr. Finlay again examined her chest and found the dulness more intense, but not increased in area, and the heart no further displaced. Temperature, morning 101·4°; evening 101·8°.

January 13th.—Patient had not a good night owing to pain in the right side, getting only fitful sleep after a morphia injection. She took tea and milk through the night, and ate porridge for

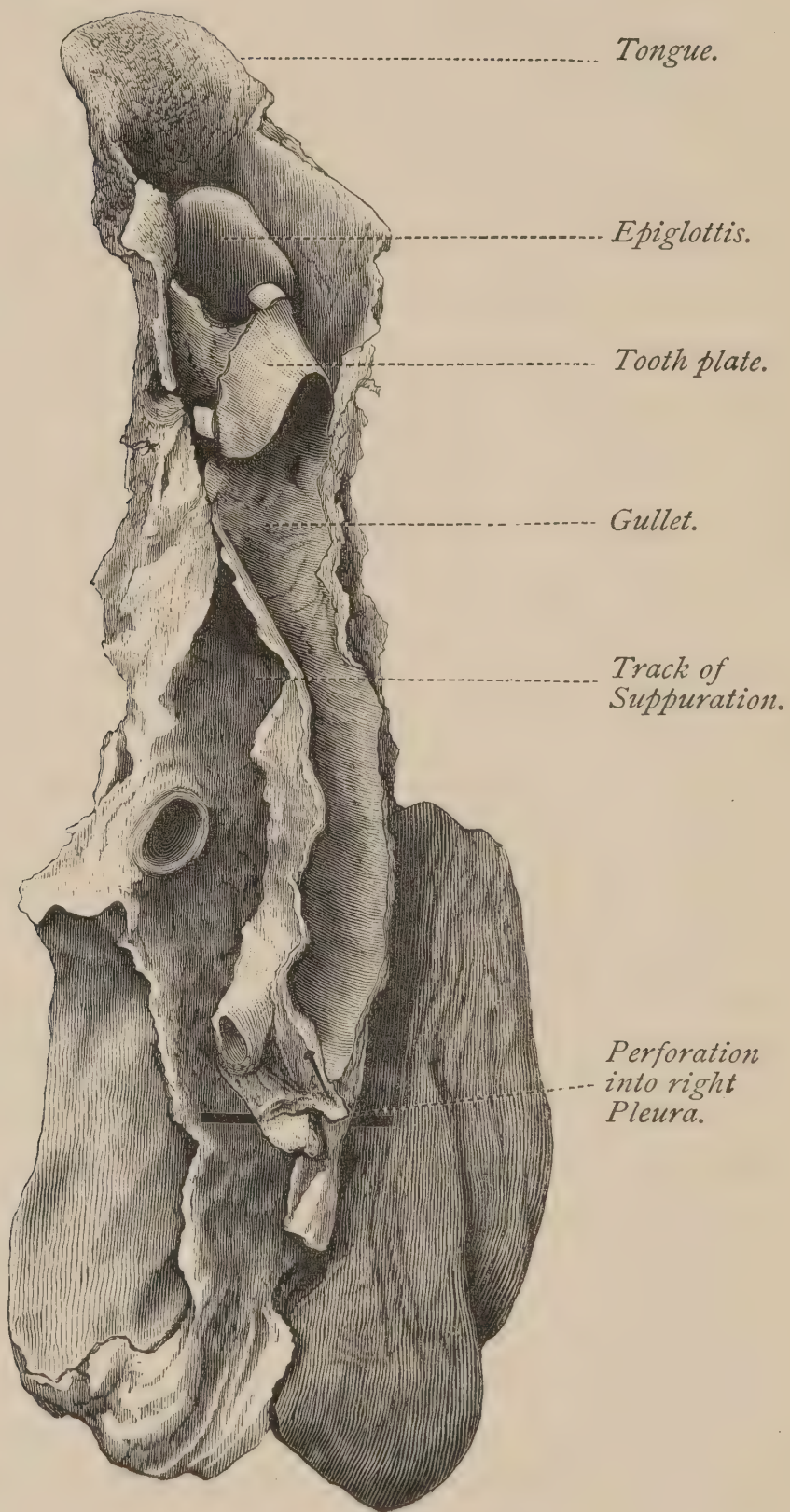
breakfast and some tapioca pudding for dinner. She is now free from pain along the alimentary tract, and swallows easily. Her bowels not having acted since admission, an enema was given, which brought away a small motion. The patient was sick twice on this day. Temperature, morning 100·28°; evening 99·6°. She again passed a very restless night, being in great pain, and feeling sick, and next day (January 14th) her pulse was rapid and soft, and she was obviously less well. Urine 1020 acid, containing a trace of albumen. Nutrient enemata were ordered, and injections of morphia, gr. $\frac{1}{3}$ as required. Temperature, morning 99°; evening 101°. Again she passed a restless painful night. About 1 p.m. on January 15th, she was seized with most intense pains in her right hypochrondrium—lower than before—so intense was the pain that it rendered her almost uncontrollable; it was only gradually overcome by morphia. To-day her breath was noticed to be sweet. Temperature 100·4°.

January 16*th*.—Patient in a clammy sweat, unconscious, with hurried breathing, very rapid running pulse; the urine contained $\frac{1}{5}$ volume of albumen. The temperature gradually fell, and at 6.30 p.m. she died. The medicinal treatment adopted consisted of three things—morphia, to relieve the severe pain; quinine, to combat the septicæmia and brandy as a stimulant when the heart's action began to fail.

The *post-mortem* examination was made by Dr. Sidney Martin, and the following is from his report:—

"*Pharynx and Œsophagus* removed together. On opening these a composition plate with two artificial teeth attached, is found impacted in the left wall of pharynx, near junction with œsophagus. One tooth is right through the wall, lying in abscess cavity presently to be described. The plate lies with its concave surface on the back of the larynx (arytenoid and cricoid cartilages), the teeth attached being just at level of commencement of ary-epiglotidean folds. Beneath the plate, mucous membrane of pharynx shews one or two recent ulcers. Where the tooth and plate have perforated pharynx the wall is gangrenous, shewing ragged ulceration, and the tooth lies outside in a small abscess cavity containing offensive pus. This abscess cavity extends downwards by a long sinuous track of suppuration (not more than a $\frac{1}{4}$—$\frac{1}{2}$in. wide) along the left side of œsophagus, passing behind aorta on into posterior mediastinum, where it deflects to the right and opens about the middle of the thorax into the right pleural cavity by an aperture about two lines in diameter.

"*The Right Pleura* contains about 90 oz. of thin and very offensive pus, with three yellow oval masses size of a bean, which look like yolk of egg


Tongue.
Epiglottis.
Tooth plate.
Gullet.
Track of Suppuration.
Perforation into right Pleura.

inspissated (? food). The pleura is covered with recent lymph and the lung is collapsed and completely airless.

"On lifting up the liver, the *duodenum* tears away from a recent attachment to it on the left lobe, the surface of the liver being gangrenous over an area 1½in. across and ¼in. deep. The duodenum attached to the liver is completely perforated by a circular ulcer 1½in. in diameter. On opening the gut the ulcer is seen to be a clean perforation through walls, no thickening or bevelling of edges. Near it is a slightly smaller acute erosion of mucous membrane and below it are two similar erosions transverse in direction, about ¼in. long by ⅛in. broad."

With the exception of "cloudy swelling" of the heart and kidneys the rest of the viscera were found normal.

Remarks.—In commenting on this unfortunate case, I think it will be best to trace the events in the order of their occurrence. And, first of all, we had here the fact so common, so often repeated in the histories of these cases—an insecure tooth-plate—insecure from no fault of the dentist, but from an accident to the plate which the patient was not sufficiently alive to the importance of and took no steps to have remedied. The displacement of this plate was caused by a sudden incautious act of deglutition, and in this

detail, too, the case is parallel to very many of the series to which it belongs.

The plate was evidently impacted at first in the lower part of the pharynx, behind the cricoid cartilage—the most likely place of all for a large and irregular substance to be arrested in its passage towards the stomach—and here it gave rise to the usual distressing symptoms, not only of pain and dysphagia, but of cough, dyspnœa and a sense of choking. An attempt was made to remove it, with the finger, ordinary forceps, and also by exciting emesis, but it failed. And now an interval of six days elapsed before any further attempt was made. It is only right to say that the doctor in charge of the case was in no way responsible for this, and that it was owing to the extreme reluctance of the patient and her husband to have further advice that so long a time slipped by before I was asked to see the case. This was the cardinal fault in the treatment. All during those six days the sharp points of the teeth and plate were not only pressing against the delicate mucous membrane, but with each effort of deglutition the constrictor muscles contracted on the plate and forced these sharp points deeper and deeper in. It is worthy of note that this ill effect of muscular contraction is more marked in the pharynx than in the gullet, as the constrictors are more powerful than the muscular coat of the œsophagus.

From this ulceration of the pharynx two ill results followed. On the one hand a tooth passed into the ulcer, and so fixed the plate that when I seized it in the forceps and caught it in the coin-catcher I found it impossible to extricate it, even when some amount of force was employed. And, indeed, it is to be feared that my very efforts at extraction only served to bury the tooth deeper and deeper in the tissue outside the pharynx. On the other hand, the ulceration of the pharynx was the starting point of a septic suppuration outside the gullet, which by direct extension led to the septic empyema, and also to more remote septic changes—ulceration of the duodenum.

The next important fact in the case was my failing to find so large a foreign body in the pharynx, and that only twenty-four hours after having it repeatedly in my forceps. Had I missed it on both occasions it might have been not unreasonably attributed to my want of skill, but this cannot be the sole explanation when the same hand and the same instruments catch the plate on a Thursday afternoon and altogether miss it on the Friday afternoon following. I wish, therefore, to lay stress upon the fact, for it is of great importance, and the knowledge that so large a body *may* be overlooked ought to make the surgeon particularly cautious in deciding

upon the absence of a supposed foreign body. Of course, my experience is not unique; you all know Sir James Paget's famous case where he found a set of teeth in the pharynx of a patient brought up to him on the supposition that he was suffering from malignant stricture of the gullet. No doubt in this room are those who can bring forward other similar cases. But the explanation of my failure, is, I think, very interesting. My opinion is that in the interval between my two attempts, the plate shifted its position a little, and in its new place fitted accurately over the back of the cricoid cartilage, so that it scarcely projected into the pharynx at all, and that then the swelling of the mucous membrane around it covered in the edges of the plate and caused even a coin-catcher to pass over it without detecting it. And I suspect that this change of position was in part due to the progressive ulceration of the tube which allowed the tooth to pass so far out that the plate fell into this unfortunate position. The evidence in favour of these assumptions is first that at the autopsy the plate was actually in this position. Secondly, that the patient herself believed the plate had moved and had "gone down." Thirdly, that her powers of swallowing were much better after she came to the hospital than before she left home.

The pathological changes in this case are note-

worthy. I have been unable to find in any of the books I have read another case quite like it. There are, of course, many recorded instances of ulceration of the pharynx and gullet, and in not a few perforation of an artery or vein has led to fatal hæmorrhage. Similarly, a pleura or the pericardium or the trachea has been pierced by a foreign body forced through the œsophagus, and in other cases peri-pharyngeal suppuration leading to the formation of extensive abscess in the neck has occurred. But in my case we had merely a long sinuous line of suppuration—no abscess—a line which progressed, however, with fatal precision until it infected the right pleura. The septic ulceration of the duodenum is a rare phenomenon, and is akin to that occasionally occurring in burns. The symptoms of this fatal malady were also rather marked: there was fever—but not high, no rigors, no swelling in the neck—nothing, in fact, to direct our attention to what was actually going on. We knew she had pleurisy, and I feared that I might have pushed the plate through the gullet into the right pleura in my attempts to pass the bougie.

One other remark is called for. I think it probable that at the time this poor woman came into the hospital the fatal process was already so far advanced that mere removal of the tooth-plate would have been a barren triumph, and

that I should still have had to record her death from septicæmia. Of this I cannot be certain, but the speedy onset of the pleurisy, and the undoubted existence of the pharyngeal ulcerations for a day or perhaps longer before that incline me strongly to that view.

I would bring these remarks to a close, with a few deductions not grounded only on this case.

1. That any but a very securely fixed tooth-plate is a grave source of danger to a patient. Adelmann tells us that 35 per cent. of cases of impaction of a tooth-plate have proved fatal to life.

2. That when a tooth-plate is impacted there should be no unnecessary delay in its extraction. That they are never innocuous, and that absence of pain and of other symptoms is no sign that grave mischief is not being wrought.

3. That as a tooth-plate in the pharynx may be overlooked, the most scrupulous care should be taken by the surgeon to assure himself of the actual state of affairs.

Discussion.

The President felt sure that the society would heartily concur in thanking Mr. Gould for his valuable paper. Before making any remarks he would like to ask if there were any hooks or wires on the plate?

Mr. Pearce Gould replied that there were not.

The President continuing, said that the paper seemed to divide itself into four heads, the popular point of view, the dentist's point of view, the surgeon's point of view, and the pathological point of view. Mr. Gould had referred to Mr. Felix Weiss's paper, which was one of great interest, but the President thought that the paper that they had just listened to would add considerably to their knowledge on this question. The popular aspect of the case seemed to be, that people would persist in disregarding the danger attendant upon wearing insecure dentures, and continue to wear them after the fastenings had been broken; Mr. Gould had pointed out the duty of the dental surgeon to draw attention to this danger so that he (the President) need not further enlarge upon it. The next point was, that an examination of the pharynx revealed the fact that the plate was imbedded at the back of it in such a way that it could not be dislodged. The pathological results which followed were extremely interesting and pointed to the necessity of treating these cases on their first onset. Mr. Hutchinson would like to ask if it would have been possible to ascertain from the patient the shape of the plate and the material of which it was constructed; and whether it would have been possible to break the plate in its position in the throat with a lithotrite.

Dr. Dudley Buxton narrated a case which illustrated one of Mr. Pearce Gould's points, viz., the difficulty there often was in making certain whether or not the plate is still in the pharynx. A young man was admitted into a provincial hospital and Dr. Dudley Buxton was able to strike

a plate in the pharynx, but not on all occasions, and others failed to make out its existence. However it was finally decided to perform œsophagotomy, but before this was done a member of the consulting surgical staff passed forceps and although repeated prolonged efforts had previously been unsuccessfully made, this gentleman succeeded in withdrawing the denture through the mouth. Another point was the use of emetics which Dr. Dudley Buxton would most decidedly deprecate. It had once been his duty to read a communication from a medical man describing such a case of impaction of a tooth plate in which the author rather prided himself upon having employed emetics, and thereby succeeded in recovering the missing denture. In Dr. Dudley Buxton's view forced vomiting should be carefully avoided, as if true impaction existed there was grave danger of hooks or sharp edges lacerating the mucous membrane. The President had suggested the use of a lithotrite for crushing the plate, Dr. Dudley Buxton had been told by Mr. Buckston Browne that he had more than once used a lithotrite as a substitute for œsophageal forceps.

Mr. C. V. Cotterel suggested that if the material of the plate had been doubtful, its being made of metal or not might have been decided by the aid of an electric battery if a galvanometer were included in the current with the exploring instrument; the contact of the latter with a foreign body of metal would be indicated on the galvanometer.

Mr. W. B. Paterson said that while looking at the specimen it had occurred to him that the plate did not seem to him to be beyond the range of vision aided by a speculum, laryngoscopic mirror and electric lamp. The plate being once seen he presumed œsophagotomy would have been decided on.

Dr. Joseph Walker related two cases in his experience, treated differently but both with happy results. The first was that of a female who swallowed a gold upper denture, she felt no inconvenience and only slight pain. Dr. Walker avoided emetics and prescribed oatmeal drink and on the eighth day the entire denture uninjured and buried in a glutinous mass of oatmeal was evacuated through the rectum.

The other case was that of a policeman in Westminster who swallowed a denture consisting of four teeth, with gold clasps round the canines, mounted on a heavy gold plate; he was inverted and in about ten minutes the gold plate rolled out of his mouth. In conclusion Dr. Walker desired to thank Mr. Gould for his paper which he regarded as educational from its first note to its close.

The PRESIDENT remarked that the important and most interesting point which had arisen in the discussion seemed to be as to the value or otherwise of emetics, and he would be glad to hear any other members who had had experiences similar to Dr. Walker's.

Mr. C. V. COTTERELL stated that in 1879 he took a practice down at Rochester where a patient had just swallowed a platina plate that held three or four teeth which were retained simply by a pivot pin in the root of the central tooth. It had very sharp points; the collars were cut up to points to go between the teeth, and the pivot pin he would say was $\frac{3}{16}$ to $\frac{1}{2}$ inch long—it went from the lateral to the first or second bicuspid. The doctor in this case recommended emetics, but the dentist, Mr. Robertson who had since died, prescribed oatmeal and chopped worsted and the prescription was followed; in five days the plate was passed without the slightest trouble.

Mr. BRUNTON said that the case which formed the subject of Mr. Gould's paper seemed a most interesting one. The point which struck him was this, did Mr. Gould seek the assistance of a dentist in trying to find out the probable size, shape, and nature of the denture? It seemed to Mr. Brunton that it would have been a considerable help to have had the assistance of a dentist.

Mr. PEARCE GOULD, in response to the invitation of the president, said he would reply first to the last speaker; he did not, as he ought to have done no doubt, seek the help of either of his dental colleagues. Mr. Hern was in the hospital while the patient was on the operating table but Mr. Gould did not ask him specifically about the size or nature of the plate. There was this point about it, he (Mr. Gould) had found the plate once and expected to find it as

easily again, not doing so he was perhaps taken a little off his guard. With reference to breaking the plate, it was his intention to do so if he could have seized it with the forceps but not seizing it the question did not arise. He would add that he should think it would be a difficult matter to break it in that position. With regard to giving of emetics, emetics had been given in some cases without good results while in others no serious consequences had occurred; personally, although he did not think emetics were of much good, he did not think much harm could follow when anything could be swallowed—he would not recommend apomorphia injection. Then as to the suggestion of detecting metal plates, there could be no doubt that under certain circumstances it would be possible, but this not being a metal plate the question did not arise. Mr. Paterson put a very pertinent question as to the possibility of seeing the plate. The first thing Mr. Gould did was to try and see the plate, but the second time he omitted to do so; he would have been better advised had he acted otherwise, and he should have put that among the final conclusions of his paper that the best means of ascertaining the presence of a foreign body in the œsophagus is by inspection; unfortunately he had to confess that in this case he was misled.

Votes of Thanks.

Votes of thanks and announcements for next meeting concluded the business.

The next meeting of the Odontological Society of Great Britain will be held at 40, Leicester Square, W.C., on Monday, May 4th, at 8 p.m. Paper by Mr. D. E. N. Caush, L.D.S.Irel., on "Exostosis," with microscopic slides and photographs. Casual communications :—Mr. J. Bland Sutton, "Odontome in a Horse;" Mr. Morton Smale, "A Case of Injury to Temporo-Maxillary Articulation at $3\frac{1}{2}$ years, causing Closure of the Jaw;" Mr. Stocken, "Cases of Absorption of Permanent Teeth;" Mr. David Hepburn, "A Case of Attrition in the First Dentition;" Mr. C. V. Cotterell, "Convertor for Electric Mallet."

Odontological Society of Great Britain.

ORDINARY MONTHLY MEETING,

May 4th, 1891.

MR. S. J. HUTCHINSON, M.R.C.S., L.D.S.,

PRESIDENT, IN THE CHAIR.

THE Minutes of the last meeting having been read and confirmed,

Mr. C. A. CLARK signed the Obligation Book, and was formally admitted by the President.

Messrs. MAUDSLEY HOWKINS and STEPHEN COXON, having signed the Obligation Forms, were duly declared non-resident members.

The following Nominations were read before the Society :—JOHN WILLIAM SAVILLE, L.D.S., Eng., 4, Bedford Circus, Exeter; CARL SHELLING, L.D.S., Eng., 7, Montpelier Row, Blackheath, S.E.

The following gentleman was balloted for and elected a resident member :—H. BEADNELL GILL, L.D.S., Eng., Silverdale, Hawke Road, Upper Norwood, S.E.

The PRESIDENT then called upon Mr. James Stocken for his communication.

Mr. JAMES STOCKEN contributed a casual communication on a case of "Absorption of Fangs of Permanent Teeth." The lower wisdom tooth shown was from a patient

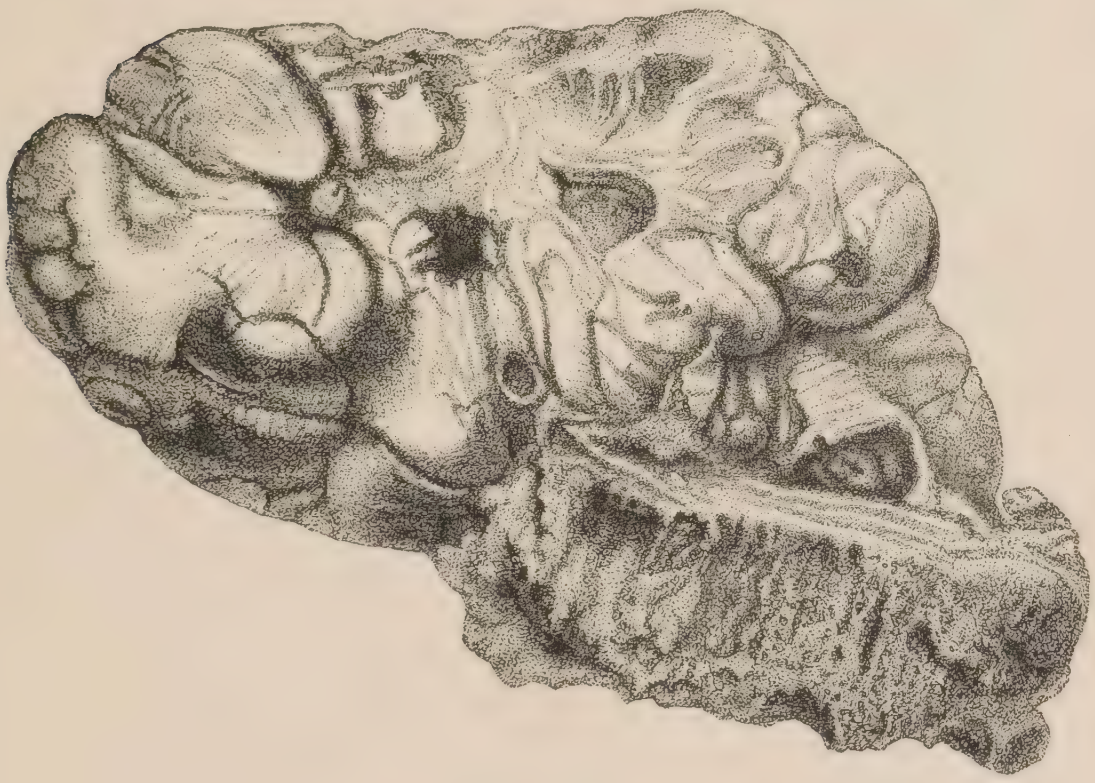
between forty and fifty years of age. He came to Mr. Stocken complaining of inability to bite upon the tooth without discomfort. On examination he found it very loose and judged it attacked by Rigg's disease; there being no opposing tooth he advised its removal; upon applying the forceps he found no resistance, in fact the fangs were entirely absorbed. By examination he fancied he could detect giant cells upon its surface, this was most probably an error; there was no bleeding, neither was there crowding. There was a fringe of tartar around the neck and also caries on the buccal surface, these two conditions may have led to irritation and subsequent absorption of the fangs. From one of the openings to the pulp chamber protruded what appeared to be a nerve fibre. This case clearly proved (if proof were needed) that absorption of the fangs of the teeth may take place quite independently of pressure arising from the development of a succession tooth or from pressure from an approximate tooth, as both these conditions were absent. Another case of absorption of the fang of a permanent tooth was that of an upper incisor; there was evidence to indicate that this had been primarily caused by periostitis.

Mr. Stocken also exhibited and presented to the Society a deciduous tooth of a horse; it was given to him by a patient who said his horse was "off his feed," and one day as he stood beside the horse, he heard something drop from the animal's mouth and upon picking it up found it to be its milk tooth. The horse was about three years old, the tooth a temporary molar, somewhat triangular in form, the under-surface presenting several cup-shaped depressions, the upper surface showed considerable attrition, the "marks" being almost obliterated, and representing an agglomeration of worn-down cusps, the lines of demarcation being of a crescent form.

The PRESIDENT remarked that Mr. Stocken's specimens were very interesting, and would be passed round; the lower molar was specially interesting and he thought Mr. Stocken's explanation of the cause of absorption was correct,

The Society would gladly accept the tooth of the horse for the museum. He would now call upon Mr. J. Bland Sutton.

Mr. J. Bland Sutton read a communication on a very large odontome from a horse. The specimen had been for a long time in the Museum of the Royal Veterinary College, London, and, in company with several similar specimens, was simply described in the catalogue as "a tumour composed



(Cementoma).

An odontome from a horse, weighing seventy ounces. Its shape and size resembles the brain of a horse quarter natural size,

of dental tissues from a horse." The odontome is of peculiar shape, and in its general contour recalls in a striking manner the brain of a horse; this is no doubt the explanation of the rumour at one time current, to the effect that it was really an ossified brain. In order to make this tale appear more circumstantial, a hole in its side was pointed out as the spot where the knacker had made an attempt upon this invulnerable organ with the pole-axe,

The tumour itself was sufficiently remarkable without any assistance of this character. It weighed seventy ounces, and was, as far as Mr. Sutton knew, the largest odontome from a horse on record. On section it had a laminated appearance, and microscopically differed from any kind of hard tumour he had hitherto examined. Sections of the tumour had been prepared by Mr. Charters White with his accustomed skill, and by an ingenious method, he had succeeded in injecting the vascular canals with a coloured fluid. This method demonstrated, what would have scarcely been suspected, that this extremely dense tumour was very vascular. Its chief structural peculiarity was the presence, in enormous numbers, of large richly branched lacunæ. Mr. Sutton had been unable to cut it up for microscopical purposes so freely as could be desired, but he had seen sufficient to justify him in expressing the opinion that it was an enormous cementoma resulting from the ossification of an enormously thickened dental follicle.

The PRESIDENT felt sure that the Society would agree in thanking Mr. Bland Sutton for bringing forward the very interesting tumour and for his lucid description of it. He would like to ask whether there was any sign whatever of a tooth in relation to this odontome.

Mr. W. A. MAGGS wished to ask Mr. Bland Sutton why he called the tumour an odontome instead of an ivory exostosis, especially as he had said it contained a great quantity of canaliculi, &c.

Mr. J. BLAND SUTTON, in reply, said that as to whether there were any elementary teeth, there was just a possibility, as there was a patch of dentine in one place, otherwise there was no appearance of anything, and as the odontome was not his own property, the owner might object to his making sections of it. With reference to Mr. Maggs' question, he thought it would be entirely retrograde to call it an ivory exostosis; surgeons who were less informed upon the subject than dentists were continually doing so, but its laminated character and structure stamped it as an odontome. An

ivory exostosis should contain converging canals and nothing more than large lacunæ without any definite arrangement.

The PRESIDENT then called upon Mr. Morton Smale, who read a communication. He said his first case was a very simple one, but perhaps it might interest members of the Society. He would pass the models round and describe the points while the specimens were being handled. The models showed an abnormality on the right side, the upper molars were grown down below the normal bite, while their opponents were only erupted to be flush with the gum. As no true meeting of the teeth occurred, the downgrowth of the upper teeth could not account for the want of growth of the lower. Careful examination of the neighbouring teeth gave no clue to the mystery of the non-growth of the right lower molars. The patient presented herself that the first lower molar on that side might, as it was giving pain, although not decayed, be extracted if possible. Before Mr. Smale saw her, three distinct attempts had been made to remove it, but unsuccessfully, which no doubt accounted for his being able to extract it, although the operation even then was performed with some difficulty. Upon examination of the mouth it seemed probable that some exostosis existed, and this, as the extracted tooth, which was handed round, showed was actually the case; but while this accounted for the difficulty experienced in its removal, it in no sense explained the abnormality of eruption.

The second case was a patient aged twenty-seven, who came under his care in 1887, anxious that some badly decayed incisors might be extracted and replaced by artificial substitutes. On examination the mouth was found to be firmly closed, and it was impossible to get a model of the mouth even had it been possible to remove the offending teeth.

The patient gave the following history:—When three and a half years old she fell from a window fourteen feet from the ground upon a brick copeing. She was able to get up and run round to the front door of the house. No bruise or wound was to be found, two teeth were knocked out, and there was slight bleeding from the ear. The doctor

who was called in attendance diagnosed it as fracture of the base of the skull. She was kept in bed for a week and then allowed to run about as usual. The mother noticed she had difficulty in eating, and on consulting the doctor with regard to this, ten months subsequent to the accident, he advised a consultation with an eminent surgeon. After the interview the mother was advised to let things alone until the teeth became troublesome, and to persevere with graduated wedges. A few years later she was taken to see a well-known dentist who advised India rubber wedges instead of wooden ones. While in 1873 another dentist was consulted who found it necessary to remove some teeth, and after wedging perseveringly for several weeks chloroform was administered, and some teeth extracted, but no good resulted so far as movement of the jaw was concerned. From this time the patient appears to have ceased all efforts and the jaw became fixed, it being only possible for food to be taken through an aperture produced by decayed teeth.

In reading this account by the patient two or three things were worthy of notice.

1. It seems highly improbable that there was a fracture through the base of the skull at the time of the accident, or the patient would hardly have been running about at the end of a week. The bleeding might be due to injury of the membrana tympani, or to injury to the glenoid cavity or some surrounding tissues.

2. When it was found possible to obtain movement and open the jaw by gradual wedging would it not have been advisable in a young healthy person to have ruptured the adhesions forcibly, and then used the wedges to keep from cicatrisation? Later when ankylosis was firmly established such a course was clearly impossible.

When the patient presented herself in 1887 she certainly was in a sad plight. The mouth, as above stated, could not be opened at all. It was impossible for her to go into society for she could neither eat nor talk like an ordinary individual, and being of a highly sensitive organization felt the deformity very much. Mr. Smale advised therefore

before anything else was done that she should see Mr. Christopher Heath with a view to his forming a false joint upon the right hand side, it being possible to feel slight lateral movement in the left articulation. Mr. Heath agreed to this and the operation was performed. The operation carried out in a precisely similar case is thus described by Mr. Heath:—"I made," says Mr. Heath,* "a small incision within the mouth immediately above the last molar tooth, and having passed a steel director to clear the way, I was able to push an Adams' saw beneath the masseter and to divide the ramus horizontally. No hæmorrhage from the inferior dental artery occurred."

The immediate result of this was successful, the patient was able at once to open her mouth until two fingers could be easily got between the front teeth. The teeth were extracted, a denture made, and a new era of life opened to the patient.

This case had not been reported before, for the reason that it seemed desirable that some years should elapse to see that the result had been permanently successful. This had not altogether been the case, for last week when the patient presented herself she could not open her mouth more than a $\frac{1}{4}$ of an inch instead of $1\frac{1}{4}$ inch, which she could do after the operation, and she was now using a screw gag every day to stretch the adhesions that had formed, but it seemed highly probable that it might be necessary to place the patient under an anæsthetic and rupture the adhesions forcibly. The patient admits that she had felt for some time that gradually it was becoming more difficult to open her mouth, until she could only just get the tip of her finger between the front teeth. In cases of this sort it was of the utmost importance that forcible movement should be persevered with after the operation, great care being taken by the patient that the mouth be not allowed to become fixed again.

Mr. Smale said he felt an apology was due for troubling the Society with so very ordinary a case, and should not have

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* "Lectures on Diseases of the Jaw," p. 111.

done so had it not been that in spite of this patient having seen three dentists and two surgeons she had lived from three and a half to thirty-two without this operation having been suggested to either her parents or herself, and it seemed possibly useful that the attention of the members might be called to a case of this sort, which in the ordinary way is only reported to the Medical Societies. Dr. Dudley Buxton who, Mr. Smale believed, had assisted at the operation, and who was present that evening, might remember some further facts about the case.

The PRESIDENT said that they were indebted to Mr. Smale for bringing forward the communication, and they would be glad to hear Dr. Dudley Buxton upon the subject.

Dr. DUDLEY BUXTON said that it appeared to him that after the very full way in which Mr. Smale had described the whole proceeding, it was hardly necessary for him (Dr. Buxton) to go into particulars, because if he did so he must traverse ground already gone over very carefully. He remembered Mr. Smale's case, and that the division of the jaw proved a tough job, and he also remembered the case read from Mr. Heath's lectures, having in both instances administered the chloroform. In that case both he and Mr. Heath were anxious that it should be successful, as both from Mr. Heath's point of view and his own it was a case of no ordinary difficulty. Mr. Smale had spoken of it as an ordinary case, but Dr. Buxton was not of that opinion. Esmarch, of Kiel, Rizzoli, of Bologna, Spanton, and other surgeons had described cases and operations for their relief, but Dr. Buxton thought that in the literature of the dental profession the matter had been passed over with little or no notice. He might say that in the case of the first patient the operation consisted in introducing a fine saw between the masseter and dividing the bone at the level of the last molar, and then by forcibly moving the jaw apart by means of a powerful gag (Heister's), the bone was completely ruptured and the tissue about the bone also torn and stretched. This had been done on two occasions. On the

second it was found necessary to pull the jaws more widely apart. On the first Mr. Heath resisted the temptation, deeming it prudent to proceed with caution; on the second considerably more force was employed, and after the bone was separated by the saw, the jaws were moved apart forcibly by means of Heister's gag. In the first operation it was difficult to get any *point d' appui* from which to get any pressure, and some of the teeth were forced out in opening the jaws. There did not seem to be any other point to dilate upon, but Dr. Buxton could only say that the appearance of the patient before and after the operation spoke most eloquently as to the value of the operation, and he agreed with Mr. Smale that the deepest sympathy could not but be felt for any human being who for so many years had stood in need of such surgical aid as this case required, and that certainly one would be inclined to give the operation a trial in similar circumstances.

Mr. Newland-Pedley said the case was very interesting, but one could not help thinking that operations for fixed joint were not exceedingly rare. Esmarch's they were familiar with, but, as in this case, recurrence after the operation frequently took place. Mr. Newland-Pedley remembered they had a case at Guy's in which a boy had ankylosis on both sides of the jaw. In that case a surgical colleague performed excision of the condyles. He believed there were several similar instances of both condyles being removed with permanently beneficial result. Such an operation was not likely to produce deformity.

Mr. Hern wished to ask Mr. Smale whether the immobility was due to the renewing or cicatrisation of the soft tissues.

The President said these cases did not seem so common as Mr. Smale had suggested or they might have expected to hear the personal recollections of similar cases from some other members.

Mr. Morton Smale remarked that Dr. Dudley Buxton had said that Mr. Heath found it rather hard work dividing the

jaw. This would be accounted for to some extent from the fact that Mr. Heath had also sawn through a tooth (exhibited). Mr. Smale wished to say that the patient was distinctly benefited and was quite of opinion that the right thing was done and was very much obliged to Mr. Heath. With regard to the cases Mr. Newland Pedley had referred to, one had read of them but one never heard of the subsequent history. It was unfortunately too common to make haste to announce the success of an operation before sufficient time had elapsed to test the permanency of the relief. Mr. Smale would like to know whether fibrous adhesion did not afterwards take place. It was for this reason that Mr. Smale had delayed the publication of the case he had brought before them. In reply to Mr. Hern, Mr. Smale thought that fibrous tissue was formed between the sawn ends of the bone, but he did not think ossification had taken place. They were able to stretch the opening, and he believed that Mr. Heath still hoped that by means of a screw gag the patient might be able to open her mouth very considerably at the end of a few weeks, but Mr. Smale was not so sanguine.

Mr. David Hepburn narrated a case of attrition in the first dentition. The case, unique as far his personal experience went, was one of "attrition" of the deciduous teeth, and associated with retarded eruption of the permanent teeth. The child, a boy nearly eight years old, had not shed any of the temporary teeth and there was no sign of the six-year-old molars or other teeth of the permanent series. The temporary teeth, as shown by the model (especially the incisors and canines), are worn down almost to the level of the gum. So much worn indeed that the pink pulps might be distinctly seen through a delicate but highly polished window of dentine. The abrasion of the teeth was most marked in the upper jaw.

The child was a hearty intelligent little fellow; had been observed to grind the teeth together at night. Mr. Hepburn would say that there was some pressure of the frontal bones, but, in this particular case, he was unable to pursue enquiries as to any latent defects in the child's constitution.

Mr. F. J. Bennett thought it a little remarkable that it was entirely the front part of the mouth that was affected.

The first and second molars did not appear to be worn down to any extent: that might be accounted for from the circumstance that the incisors began to be worn down before the eruption of the molars. At any rate, it seemed remarkable that it should only have occurred in the front of the mouth. He had seen the first and second temporary molars worn down in that way in children and also the incisors, but in the cases he had seen the wearing had always been distributed uniformly.

Mr. C. V. Cotterell said he proposed to bring before the Society an instrument which he felt sure would be a great boon to all. Batteries, primary and secondary, had been very largely used by all for a motive power for the dental engine, electric mallet, and small electric lamp for the mouth. But every battery failed sooner or later, and his experience was they failed very soon. The convertor which he showed was the idea of Mr. A. B. Woakes, of Harley Street, and was to reduce the electric current as supplied from the mains from 50 or 100 volts to three volts, and from ten ampères to only half an ampère. It is a reversed induction coil. The primary coil, with fine wire and many turns, has a resistance of about 50 ohms. and allows as much electricity to pass as 3-16 c.p. lamps would require, which is two ampères. The secondary coil contained thicker wire and only a few turns; it had a very much lower electro-motive force (only sixteen volts) but a greater number of ampères, viz., ten. Most cautery burners, lamps, motors, mallets, &c., required less than this, and the current strength, as well as the number of volts, could be conveniently regulated by moving the primary coil. When drawn out the current of the secondary coil has only about three volts and half an ampère; by pushing it home this became gradually increased to sixteen volts and ten ampères. The current could be used for two purposes at the same time, viz., light and cautery or light and motor, as there are two sets of terminals. In order to prevent the electricity being wasted there was a lamp which became incandescent immediately the apparatus was connected with the main, and ceased to give light only

after it had been disconnected. He added the patent had been applied for in Great Britain, the United States and Germany, and it was made by R. Schall, of Wigmore Street. Mr. Cotterell very much regretted that the current was not laid on in the Society's rooms, as he would have liked all to have seen the steady way the convertor worked. The convertor could also be employed for the faradic current and so used in tooth extraction.

Mr. C. S. Tomes asked whether Mr. Cotterell meant that the convertor enabled him to utilize the supply from the mains to drive the motor and dental engine, and that the alternating current was transmuted into a continuous current.

Mr. Cotterell replied that he had not a motor, but Mr. Schall had, and he (Mr. Cotterell) understood that the motor was worked satisfactorily from the mains by means of this convertor. He believed the alternating was changed to a continuous current.

Mr. C. S. Tomes, notwithstanding Mr. Cotterell's reply, felt somewhat sceptical as to whether the convertor would accomplish all that Mr. Cotterell gave it credit for, but if it would, then it was a matter for great satisfaction to the dental profession. It was an end Mr. Tomes had long desired to obtain, and one for which he had spent no little time, but in vain.

Mr. G. Cunningham said that Mr. Cotterell's remarks seemed to imply that the electric cautery was exclusively of use to the surgeon. Mr. Cunningham found it of great service in some dental operations. It was, in his opinion, the least painful method of removing overgrowths of gum.

The President then called upon Mr. Caush for his paper on exostosis.

Exostosis.

By Douglas E. Caush, L.D.S.I.

Mr. President and Gentlemen,—Before reading the paper I have the honour of bringing before you to-night, I desire to thank Mr. T. Charters White, for had he not drawn attention in the *Journal of the British Dental Association* to the method of preparing hard sections by means of ground glass and pumice powder, this paper would probably never have been written. Having tried the method as suggested by Mr. T. C. White, we were surprised at the ease with which hard sections could be prepared. After having prepared a few of these and not understanding the variations of structure seen under the microscope, we were led to consider the desirability of studying the subject of exostosis more fully than we had previously done.

The plan adopted was to take a tooth and cut off as many sections as it was possible to obtain, commencing at the apex of the root, and leaving off at that point of the tooth where the enamel joins the cemental tissue; thus a series of sections were cut from each tooth. These were numbered

as cut off and mounted in their consecutive order, thus enabling us to examine any portion of the root, and to trace any modification of the tissue seen under the microscope. We shall this evening, by the aid of some of the slides so prepared, bring before you the result of our examination.

One of the first things noticed in the roots of teeth exostosed was the absence of the original layer of cemental tissue, as seen in teeth of normal structure, and in many cases great alteration in the granular layer; by the granular layer we refer to that layer of somewhat porous tissue existing between the dentine and cementum, at the point of union of the two tissues.

The original cemental layer was in almost all cases absent at or near the apex of the roots, and instead of the well-marked line of demarcation between the two tissues, the dentine terminated in an irregular manner, the edge of the dentine being entirely broken up, while in place of the granular layer there is a mixture of the two tissues, oftentimes showing in the dry sections large irregular spaces, these spaces probably having been filled with semi-fluid matter before the teeth were extracted.

Nearer the crown this absorption was much less marked, though here and there the dentine was scooped out at different points of the tooth

and afterwards filled with cemental tissue, yet the nearer the crown the more perfect the granular layer ; but at those points where absorption had taken place the line of demarcation was much more definite than at the apex.

These changes are probably due to the fact that in all cases where new tissue is being formed, one of the earliest stages is a slight increase of the blood supply, so slight, perhaps, that it does not produce any feeling of discomfort to the patient, while on the other hand it does produce increased activity in the cells forming the alveolo dental membrane, and at the point where there is an increased blood supply the cells become active, and there are probably a large number of cells developed, similar in character to those cells known as giant cells or osteoclasts, their duty being that of absorption. This increased blood supply produces one of two results, the cells either commence to absorb the alveolus, or the cemental layer surrounding the dentine. I think when the irritation is slight, its first action is upon the cemental tissue, and these cells are developed in the alveolo dental membrane on that surface which is attached to the layer of cemental tissue ; these cells at once commence to absorb the tissue, and after having absorbed the original layer of cementum pass on to the granular layer. This layer being but imperfectly calcified is easily absorbed away, and the

absorption goes on till the cells come in contact with the dense and more calcified tissue of the dentine; here, as a rule, the absorption ceases, but if, as is sometimes the case, the dentine at this point is imperfectly calcified, the absorption goes on till the dense portion of the tissue is reached, thus producing the irregular margin as seen in some of the sections after the granular layer and soft portions of the dentine have been absorbed away, and as the cells come to the more perfectly calcified tissue, this process of absorption receives a check and is discontinued, plenty of room having been obtained. A change now takes place in the cells, they no longer press upon the tissue, and thus they cease their functions, while many of them become changed in character to true cementoblasts or cementum producing cells; these soon calcify after others are developed, and a layer of new tissue is formed close to the dentine, partially filling up the irregular spaces previously produced by the absorption, while here and there, entangled amongst this new tissue, are to be found a number of cells corresponding to the giant cells already referred to; these cells are coloured by the carmine stain, and a great many of them occur in some of the slides we have examined. Leaving now for a short time the apex, and on examining the sections nearer the crown, we find here and there scattered

over the section, certain portions of the dentine absorbed away in semi-lunar cavities, and these cavities filled with cemental tissue. These markings have already been brought before this Society by Mr. G. Henry, of Hastings, in a communication entitled "Enostosis."

The absorption is, as a rule, restricted in area, but usually of much greater depth than the absorption as seen at the apex. We shall endeavour now to throw on the screen slides showing this form of absorption. In many of these sections it appears as if the absorption does not take place until after one or more layers of cemental tissue has been added to the root of the tooth, thus differing from the early stage of absorption already spoken of. Dr. G. V. Black well illustrates this in his work "On the Periosteum and the Peridental Membrane."

We will now ask you to go back so that we may consider the development of the cemental tissue. After the cementoblasts have been active for some time, and a layer of cemental tissue has been calcified around or partially around the root, there appears in many cases to be a time of rest, and this time of rest produces certain markings that appear somewhat like lines surrounding the dentine. These lines are known as "incremental lines of Salter;" they do not mark out equal layers of tissue

around the dentine, but are frequently very irregular. We may often find on the one side a large deposition of tissue, while, on following the incremental lines, we find they contract until they are but a very slight distance from the previously formed line. These lines also enable us to draw conclusions as to how the tissue has been deposited, whether it has been rapidly deposited, or otherwise; for in the rapidly-deposited tissue there is usually very few lines, but a large number of lacunæ. These lacunæ are as a rule large, and with plenty of canaliculi radiating from them, while in the slowly-deposited layer the lacunæ are much smaller and with fewer canaliculi; the lacunæ are also as a rule further apart, and the tissue is at many points an almost structureless matrix. This condition appears to be produced by continuous irritation, though the irritation may be so slight that the patient is entirely unconscious of anything being wrong with the tooth, and I believe it may be produced by slight alteration of the articulation, or any other slightly disturbing factor that will keep up continuous, but slight irritation of the membrane surrounding the cemental tissue. In those cases where the incremental lines are manifest there have been times of rest, and each layer appears to be distinct from its predecessor; this I think can easily be understood when we consider

the growth of the cemental tissue—it is from within outwards, that is to say, from the surface or edge of the dentine towards the alveolus. May not this also help us to form correct ideas as to the way in which the tissue has been re-absorbed, for in many cases, after one, two, or more layers of cemental tissue has been deposited, there are definite lines of reabsorption, this probably taking place after a time of rest and on the renewal of activity. This re-absorption is also well shown by Dr. Black in his work already referred to, at a later period a fresh layer of tissue is re-deposited to fill up the cavities produced by the absorption. This absorption may be produced from a larger blood supply inducing increased activity in the cells, on the inner surface of the membrane, produced by periostitis or even the more acute alveolar abscess. Some of these markings are certainly produced by the latter, for we frequently find that a large portion of the deposited tissue has been re-absorbed in those cases where there has been either acute or chronic abscess. We also find in some of these cases, especially where the abscess has been chronic, not only that the cementum has been absorbed, but that even the dentine has been absorbed, leaving pits or depressions that sometimes pass almost into the pulp chamber; and even these are found in some cases to be lined or filled with a fresh

layer or layers of cemental tissue: this occurs in cases where the tissue has become healthy after the abscess had enlarged the cavities. The excavations of a semi-lunar character as seen nearer the crown in the granular layer, are probably produced at those points where the dentine is defective in structure, and had we been able to examine the tooth prior to the absorption of the tissue, we should probably have found interglobular spaces and imperfectly calcified tissue.

We also noticed that in the additional tissue there is oftentimes a number of canals, many of them having a lining membrane, and it appears as if the new tissue had been deposited around the blood-vessels in the alveolo-dental membrane, and by the presence of a membrane in these canals we may presume that they were used for their original purpose after the new tissue had calcified. It would appear as if it was easier for the newly deposited tissue to pass around a blood-vessel than to absorb the tissue composing the walls of these vessels, thus we find in the cemental tissue, canals both transverse and longitudinal; these canals probably supply nourishment to the tissues, and in some cases, I believe, to the pulp itself. This now brings us to the next point of consideration, the connection between the pulp and the cemental tissue. In many cases we found there

was an intimate connection between the two through the dentine, by means of canals, these in many cases passing at right angles through the dentine. Some of these canals where passing through the dentine, are found to be lined with a tissue corresponding in microscopic structure to that found in the cemental layer, and it would appear as if the canals had in some cases been larger than they were at the time of the extraction of the tooth, and had been reduced in size by the deposition of a tissue having lacunæ and canaliculi as in the cementum.

Another point of interest is the external contour produced by the additional tissue. This tissue oftentimes unites two or more roots together, and forms one solid mass of tissue. Though much new tissue may have been deposited it is very exceptional indeed to find anchylosis of the roots to the roots of adjoining teeth, or even to the walls of the alveolus, and I think this may be accounted for by the fact that as the cemental tissue is deposited on the cementum, we frequently find the alveolo-dental membrane contains a number of giant cells near the external surface, and doubtlessly these cells absorb the alveoli. At the same time the new tissue is being deposited upon the surface of the cementum, the work of these cells being the same as in the case of the permanent tooth, where the cells

in the membrane absorbs the roots of the temporary teeth, and thus there is always a layer of membrane between the two tissues, that of the cementum and that of the alveolus. In those cases where a piece of alveolus has come away during extraction, I have only found the two connected by fibrous tissue, and there has been no true bony tissue uniting them. We also found in some cases the cemental tissue was deposited in irregular patches and nodules over the surface of the roots, and in such cases it is usual to find the original cemental tissue has been absorbed away at these points, and the dentine has been scooped out, leaving a series of semi-lunar cavities; these cavities are afterwards filled with new tissue, and I think this is the way in which the change spoken of as "Enostosis" has been produced. At the margin of this new tissue we frequently find the tubuli of the dentine anastomosing with the canaliculi of the lacunæ of the new tissue, and thus forming a direct means of communication, either of sensation or of, in some cases, plasma for nourishment to the tissues to or from the pulp. This also is the cause, I believe, of the hyper-sensitiveness of that portion of the dentine directly under the enamel. The inter-globular spaces are filled with a semi-calcified substance, and these spaces are brought into communication with the pulp through the

tubuli. That these tubuli are minute canals filled either with a fluid, or semi-fluid may be demonstrated as follows:—Take a newly extracted tooth with a live pulp, and if it can be obtained from a young patient so much the better, as the tissues are less thoroughly calcified; then with a corundum wheel grind until the pulp is almost exposed, afterwards break through the thin wall of bone to expose the pulp, place this in alcohol for a few days, or if necessary weeks, then place it into an alcoholic solution of any of the aniline dyes and allow it to remain in this solution for a few days; then take the tooth out and wash thoroughly in water, and after it is thoroughly washed rub down between two pieces of ground glass with pumice powder and water, finishing with water alone; after it is rubbed down mount in balsam with the surface water removed as suggested by Mr. White, now examine with $\frac{1}{6}$ inch power, and I think there will be no doubt as to the condition of the tubuli. Such a section I have with me and shall be pleased to place it under the microscope. As we may imagine, where we have a large amount of new tissue deposited, it is not at all an unusual thing to find encysted lacunæ in this tissue, as if for some cause the single, or perhaps a group of two or more cells, with their walls absorbed away have become calcified and are quite distinct from the sur-

rounding tissue, and this brings us to the last change we wish to bring before you to-night, and that is, the alteration of the shape and condition of the pulp chamber and canals. In exostosed teeth we have noticed, especially in those teeth that have been much exostosed, that there is a great alteration in the character of the chamber or canals, and in the dentine surrounding the same. Rarely do we find that there is any pulp-calcification, as seen in those teeth where secondary dentine is produced, or as seen in cases where pulp stones are produced by the partial calcification of the pulp; but in cases where there is any amount of exostosis it would appear as if absorbtion of the dentine surrounding the pulp had gone on at the same time the changes were taking place on the exterior surface of the root, so that the canals became enlarged, and that in a most irregular manner. We frequently find the canals of two or more roots thus form one continuous canal, and in many of these irregular (oftentimes semi-lunar) excavations giant cells (osteoclasts) are seen similar in character to those seen between the dentine and the cementum, and in the alveolo dental membrane. It would appear as if these cells were the motive power for producing these excavations.

There also appears to be a second stage in the changes that take place, and this also agrees with

those changes that take place on the exterior of the root, namely a redeposition of tissue after the absorption has taken place to, partially—or in some cases fully—occupy the space left by the excavations previously made.

This tissue corresponds in character to the tissue being deposited upon the exterior surface, and is in many cases the same in microscopic structure, with lacunæ and canaliculi anastomosing with those surrounding them in the newly-deposited tissue. May not this show us why we have such difficulty in diagnosing between exostosis and disease of the pulp, though as far as we have been able to ascertain, gradual and diffused exostosis does not produce any acute pain, but where acute pain has been induced, the new tissue has been deposited at the apex of the root or roots, and constricts the pulp itself at the point where the pulp leaves the apex of the tooth; or exostosis may produce pain in those cases where we have slight irregular patches (nodular) of new tissue deposited over the root. At these points there has been absorption of the original cemental layer, and penetration into the imperfectly calcified dentine in the granular layer, thus setting up irritation through the impulse passing through the tubuli of the dentine direct to the pulp itself.

Discussion.

The President said that Mr. Caush's paper had opened a considerable field for observations to be made, and he (the President) therefore felt fully justified in prolonging the meeting. The points in the paper which seemed to be of special interest were those in which Mr. Caush alluded to the presence of vascular channels through the dentine and cementum. Another point was the enlargement of the interior of the pulp canals, and the occurrence therein of giant cells and excavations that had been made. Mr. Caush's explanation of the sensitiveness of dentine near its periphery was most ingenious and interesting. It was, however, a matter of considerable difficulty to discuss a purely scientific paper of that kind, as it were, offhand. They were very much indebted to Mr. Caush for it and for the interesting lantern exhibitions ; their thanks were also due to Mr. Curtis for the successful way in which he had manipulated the slides.

Mr. F. J. Bennett said the members would doubtless be inclined to agree with the President as to the difficulty of discussing a paper so full of detail. Mr. Bennett would have been glad to have seen the specimens under a higher power so as to obviate an appeal to the imagination for the lacunæ and giant cells. He also had some difficulty in understanding how the giant cells could have been seen after they had been rubbed down with a corundum wheel. Again, in many cases canals might be seen passing between the surface of the root and the pulp cavity, and he had considered it to be in this way that the pulp chamber became absorbed, by the passage of osteoclasts down these canals to the cavity. Mr. Bennett had a specimen in which the entire interior had been largely

excavated by means of cells leading from the surface of the teeth to the cavity along such canals. One point which struck him as being novel was the statement that there was no appearance of secondary dentine in those cases in which exostosis was present. Mr. Bennett could not recollect having met with secondary dentine in cases of exostosis, but its absence was a point which they should try and verify. He thought it would have been interesting if Mr. Caush could have furnished them with some details as to the cases from which the specimens had been selected, they would have been glad to know why it was that the pulp canals were enlarged and a little clinical history would have helped them.

Mr. W. Hern wished to ask Mr. Caush if he had examined the loose bodies which are often found in the pulp chamber. There was also a point in connection with those canals which were shown in some of Mr. Caush's excellent specimens, in which the blood canals ran from the dentine to the cementum. It seemed possible that these canals might explain the periostitis which occurred sometimes when devitalizing teeth. There was a periostitis which occurred when the pulp was half dead, that is to say when the crown portions were dead and the other parts were not: due apparently to vaso-motor disturbances of the vessels, and not to direct irritation by the arsenious acid on the periosteum. This kind of periostitis passes off with the death of the pulp, and can often be cut short by an additional application of the devitalizing agent to a pulp which still retains some of its sensation. The presence of vascular canals connecting the pulp and periosteum tends to confirm this view.

The President said there were one or two specimens which Mr. Caush had alluded to to be seen under the microscope, perhaps he would show these at the close of the meeting. There was one point which the President did not quite follow as the paper was being read, viz., as to the sensitiveness of the dentine close under the enamel, perhaps Mr. Caush would explain that more fully in his reply.

Mr. Caush desired to thank the Society for the kindly

way in which the paper had been criticised. With regard to Mr. F. J. Bennett's remarks, he would say at once that none of the slides exhibited had been touched by the corundum wheel. Mr. Caush thought he had made it sufficiently clear in his paper that the specimens had all been rubbed down by the method of Mr. Charters White, and that but for the information which Mr. White had given them as to his method his (Mr. Caush's) paper would probably never have been written. With regard to the giant cells which Mr. Bennett could not understand, Mr. Caush could only say that the slides were on the table to be seen under the microscope, which might help Mr. Bennett—possibly Mr. Caush had given wrong names to appearances. Then, again, with regard to the canals passing from the dentine to the pulp, if Mr. Bennett would remember, there were some of the slides projected on the screen in which the canals only passed half-way through the dentine, so that in these cases it would have been impossible for the canals to have passed from the dentine to the pulp, it must have been outwards. With reference to Mr. Hern's question, Mr. Caush had only examined a few very loose bodies—they were rather difficult to get at: in those he had examined he had found very little structure whatever, and as a rule a few tubuli scattered through the structure. With regard to the remarks of the President, perhaps Mr. Caush did not make himself quite clear; what he desired to prove was that the tubuli were hollow, and that sensation goes direct through them from the pulp, and in that case nerve fibres in the tubuli form a rude means of giving sensation. In conclusion, he had only again to thank the Society for the kind manner in which the paper had been received.

Votes of Thanks.

Votes of thanks and announcements for next meeting concluded the business.

The next meeting of the Odontological Society of Great Britain will be held at 40, Leicester Square, W.C., on Monday, June 1st, at 8 p.m. Short Paper by Mr. F. H. Balkwill, L.D.S.Eng., "Notes on some Morphological Dental Irregularities in some of the Skulls in the Museum of the Royal College of Surgeons of England." Casual Communications:—Mr. Sewill, "The Production of Caries by Artificial Means out of the Mouth," illustrated with microscopic sections; Mr. A. W. Barrett, (1) "A Clamp extemporised to arrest Alveolar Hæmorrhage," (2) "An Underhung Bite probably due to Incomplete Development of Upper Maxilla, dependent upon Non-eruption of Wisdom Teeth;" Mr. Ackery, "Unilateral Absence of Teeth in a Patient aged 35"; Dr. Penrose, "A Case of Abnormal Dentition."

Odontological Society of Great Britain.

ORDINARY MONTHLY MEETING,

June 1*st*, 1891.

MR. S. J. HUTCHINSON, M.R.C.S., L.D.S.,

PRESIDENT, IN THE CHAIR.

THE Minutes of the preceding meeting having been read and confirmed,

Mr. GEORGE OLDHAM WHITTAKER, L.D.S.Eng., King's Chambers, 26, King Street, Manchester, was nominated as a non-resident member.

Mr. HORATIO C. MERIAM, D.M.D.Harvard, 257, Essex Street, Salem, Mass., U.S.A., was, on the recommendation of the Council, duly elected as a corresponding member.

The CURATOR (Mr. STORER BENNETT) announced the donation by Mr. Henry Sewill of a series of specimens illustrating the production of artificial caries out of the mouth, and also stated that the supplementary catalogue of the Museum had been written up from 1884 to date. The catalogue was kept in the Museum, and might be consulted by the members.

The PRESIDENT remarked that the Society was very much indebted to Mr. Storer Bennett for the considerable labour and trouble he had expended in writing up the book.

Mr. Barrett showed a clamp which he had requested Messrs. Krohne and Sesemann to make for him. It was used to compress a plug into the bleeding socket of a lower molar. The patient had been quite unable to keep *in situ* any compress applied in the usual manner. Bleeding had persisted for four days, but the clamp remained unmoved for thirty-six hours, and hæmorrhage was thus readily arrested.

Mr. Barrett also showed, and presented to the Museum, models of a greatly underhung bite. The patient was twenty-one years in age, and up to the age of ten his bite was normal. The condition has not been inherited. The maxillæ are about of equal length in an antero-posterior direction. The upper wisdom teeth were not erupted; the lower wisdom teeth were of large size and articulate with the upper second molars. It would appear that the lower jaw has been thrust forward, or that the angle has become specially obtuse. Neither of these conditions, however, are now to be readily demonstrated when the patient is examined, and the cause of the deformity is somewhat obscure.

The President said that the clamp seemed a very ingenious arrangement for supplying the place of digital compression usually resorted to and found useful.

Mr. F. J. Bennett thought that the last case might be accounted for by the unusual angle of the ascending ramus of the lower jaw. Being an obtuse instead of a right angle, it threw the jaw forward, and this direction once being given, its tendency was to increase.

Mr. R. H. Woodhouse, while commending the ingenuity of the clamp, expressed a preference for his own method of ligaturing in cases of hæmorrhage, as it was more comfortable for patients, enabling them to sleep and masticate without much inconvenience. In Mr. Barrett's case Mr. Woodhouse would have ligatured the teeth on either side, round the bicuspid in front and the second molar behind, then plugged the sockets with styptic colloid, placing a piece of cork over the plug, then drawing the tails of the silk

ligature and tying them firmly. Only within the last week he had adopted this method in a stubborn case in the hospital; the patient remained some time to test its efficiency, and it was completely successful.

Mr. J. Ackery, being called upon by the President, said he regretted to have to begin with an apology. He had hoped to bring the patient for examination at the meeting, but he was a working man and could not leave his work; the same cause had prevented Mr. Ackery's obtaining a model, but he hoped on some future occasion both to bring the patient and obtain a model. The case, which had been sent to him through the kindness of Mr. Howard Marsh, presented a rather unique condition of the right side of the lower jaw. The man was thirty-five years old, and it was alleged that he had never had any teeth in that region with the exception of an incisor—probably the central—and a molar—probably the second molar. Mr. Ackery called upon the mother, who was seventy-three years of age, in the hope of eliciting some information which might throw light upon the case, but the old lady's garrulity and inexactness made it quite impossible to learn anything beyond the fact that the patient had had no illness which could in any way affect the jaw; the only thing he had suffered from was fits. The case was peculiar, and was not one to be accounted for by the possibility of teeth having been removed, as the jaw itself was not developed on that side.

The President invited any members who had met with similar cases to relate them, and remarked that Mr. Ackery had shown so much ability in discovering and interviewing the relatives of his patient that he might perhaps be able to find out the doctor, who would possibly be able to furnish more reliable information. It would be recollected that Mr. Ackery had on previous occasions brought to their notice cases of bilateral absence of teeth.

Mr. C. Robbins reminded the Society that in January of this year he had presented the model of the mouth of a patient, aged twenty-one, in which there was an entire

absence of central, lateral and canine on the left side. He would be seeing this patient again in the course of a few days, and would make further enquiries as to the temporary teeth. He was waiting to see if there were any more teeth to come through, as a fulness about the palate existed. As might be supposed, the jaw had a very abnormal appearance.

The PRESIDENT then called on the Secretary to read Mr. Balkwill's paper, Mr. Balkwill being unable to attend.

Notes on some Morphological Dental Irregularities in some of the Skulls in the Museum of the Royal College of Surgeons of England.

By F. H. Balkwill, L.D.S.E.

Mr. President and Gentlemen,—Some years ago, when interested in the development of irregularities in the cusps of modern English teeth, I wished to compare these with those of less civilised races. Through the courtesy of Professor Flower, I was allowed to examine the collection in the Museum of the Royal College of Surgeons in London, of which at that time he was Conservator.

I took notes of the teeth of about 400 crania, and hoped at some future time to enlarge these observations, which, however, I have never done. I wish, therefore, to place these notes on record as some of them may prove interesting, and at any rate are then at the service of future investigators.

The skulls were on shelves in cabinets, and apparently had been frequently re-arranged, as the numbers on the skulls were by no means consecutive, but the numbers on each particular skull do not seem to be altered, as during the

summer of 1890, wishing to take models of two, I easily found them again, although a large collection had been added since I previously examined them; I should think, therefore, that any skull might be referred to by the numbers here given. On examining each batch of skulls, I noted anything observed with the number of skull, and then, before closing the cabinet, counted the number of skulls examined with such description, if any, as was labelled on the shelf.

The following is a transcript of the notes:—

First lot of Skulls examined—24.

1,542.—Old Roman. Sulcus in upper lateral.

327.—St. Michael's Church, St. Albans. Two supernumeraries between laterals.

302.—From Tumulus, Cemetery, Berkshire. Extra cusp to upper molar.

Second lot of Skulls examined—52.

1,301. — Boschisman girl. Wisdoms not through, teeth crowded, extraordinary development of second lower bicuspids on both sides, teeth approaching in size a badly formed molar, all the teeth very clubbed.

A model of the lower jaw accompanies the paper with photograph; these do not, however, give a good idea of the teeth, as from their crowded position the model was a good deal dragged.

154.—African Negro, Bahia, Brazil. Left supernumerary opposite wisdom.

1,234.—Amazon, Dahomey, Africa. Slight sign of extra cusp on second and third right molars only. (Note probably upper.)

1,228.—Dahomey. Supernumerary molar.

1,650.—Eboe, Old Calabar. Upper wisdoms absent; second bicuspids smaller than first.

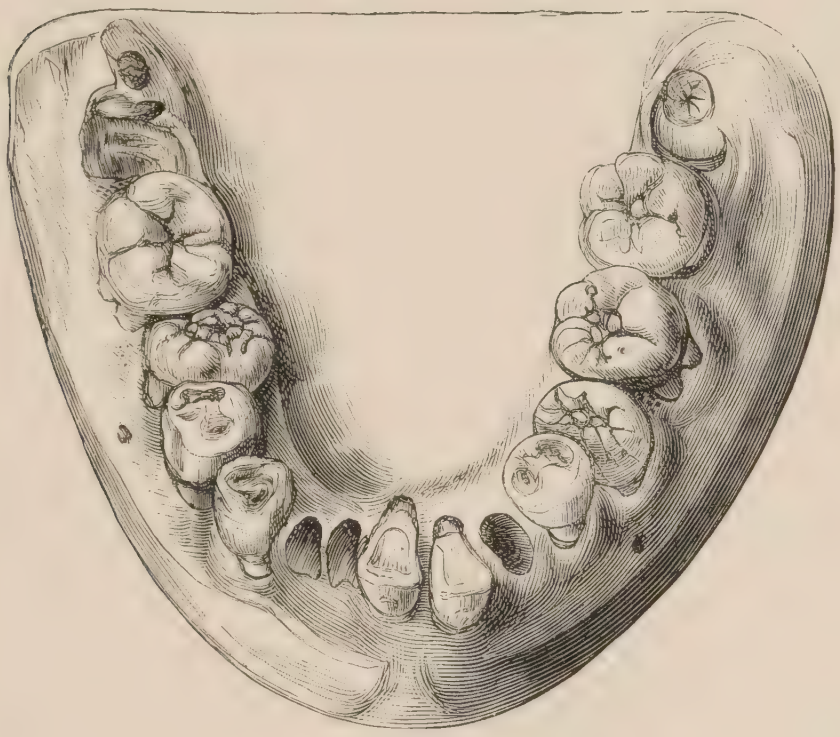

Fig. I.

No. 1,301 Museum, Royal College of Surgeons.—Photograph of cast of lower jaw of Bsochisman girl, to show abnormal size of second bicuspids—actual size.

1,363.—Negro. Lower left canine and lateral—apocryphal.

1,624.—Debeara. Apocryphal left central.

35.—Apocryphal, lower bicuspid.

36.—Ditto, right upper canine.

31.—Ditto, all over.

84.—Apocryphal.

52.—Ditto.

125.—Ditto, left upper bicuspid.

1,290.—Left wisdom slight extra cusp.

1,291.—Apocryphal.

1,292.—Right upper first bicuspid crowded in.

1,284.—Upper first molar slight extra cusp anterior (lingual?) aspect.

Third lot of crania--15.

1,302.—Only left wisdom (upper ?) second molar same side decayed, teeth crowded, second lower molars decayed.

Africa.

1,264.—Right and left upper first bicuspids decayed on both sides. Three roots, or nearly so, on one side more than the other.

Fourth lot of crania—48.

292.—Eboe, Guinea. Anterior extra cusp, as in 1,284, on both first upper molars.

Fifth lot of crania—48.

Melanesia.

1,079.—M. Fan, first upper molars, extra cusps as in 292.

1,626—Debeara. Cluster of supernumerary teeth in region of left bicuspids; alveolus for third bicuspid on right side.

1,245.—Extraordinary lower second bicuspids width of molar.

3,380.—Slight mark of extra cusp, upper molars.

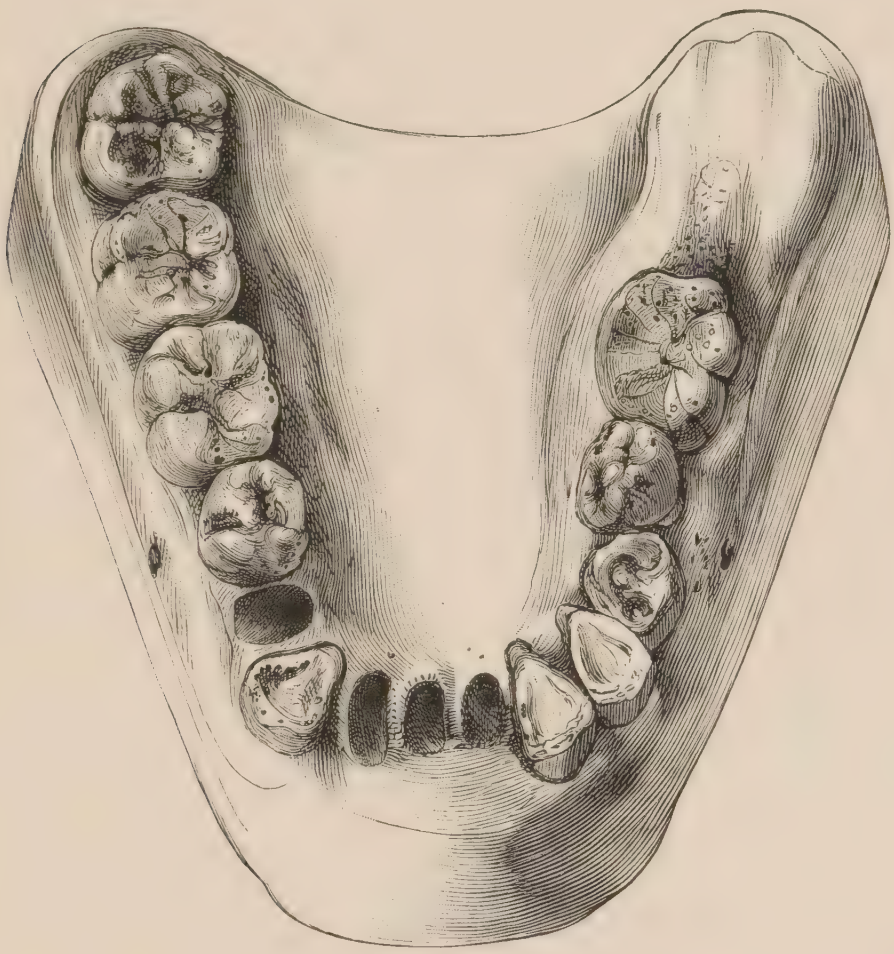

Fig. II.

No. 1,245, Museum, Royal College of Surgeons.—Photograph of cast of lower jaw to show unusual size and shape of second bicuspids—actual size.

1,224.—Ditto, ditto.

1,216.—Teeth crowded, sulcus in upper laterals.

Sixth lot of crania—22.

Papua.

82.—Extra cusp on first molar.

Seventh lot of crania—47.

New Caledonia.

1,159.—Right upper first molar, extra cusp.

Australia.

1,062.—Upper wisdoms dwindling.

Eighth lot of crania—25.

America.

Comparatively feeble.

Ninth lot of crania—37.

Eskimo.

I have no note taken of these 37 Eskimo skulls, but speaking from memory the arches of the jaws were full round and uncrowded; the shape of the cranium, on the other hand, was long and narrow, an observation contrary to my expectation. The suggestion occurred whether if the Eskimo are in the habit, as related by some travellers, of chewing the seals' skins in dressing them to render them soft, this practice may not account for their fully arched jaws.

Tenth lot of crania—34.

Owyhee.

803.—Left upper wisdom, extra cusp small.

Maori.

769.—Supernumerary between upper centrals.

766.—Extra cusp both first molars (upper?).

749 B.—Skull of Gilbert Islander: large masticating teeth; feeble upper incisors, which are decayed; three roots in right upper pre-molar (first or second ?); left bicuspid alveolus, showing division as if for two external roots; lower left second bicuspid, signs of division in external roots; lower right first and second bicuspids, the same strongly.

Eleventh lot of crania—47.

Indo Malay Archipelago.

284.—Nay Kay. Three roots right first lower molar.

1,376.—Signs of slight divisions in outer bicuspid roots in first and second upper right side, first upper left side, first lower right side, first lower left side.

Twelfth lot of crania—8.

Asia.

Thirteenth lot of crania—26.

Asia.

The following are the points which seemed worthy of noting:—

In the first it was evident that many of the skulls belonged to owners who met violent deaths,

which had often spoiled the dental armature. Interested parties had supplied the deficiencies thus caused, to make up appearances before parting with the skulls to the museums. Those skulls found in this state have been marked *Apocryphal.* I had supposed that the extra lingual cusp of the

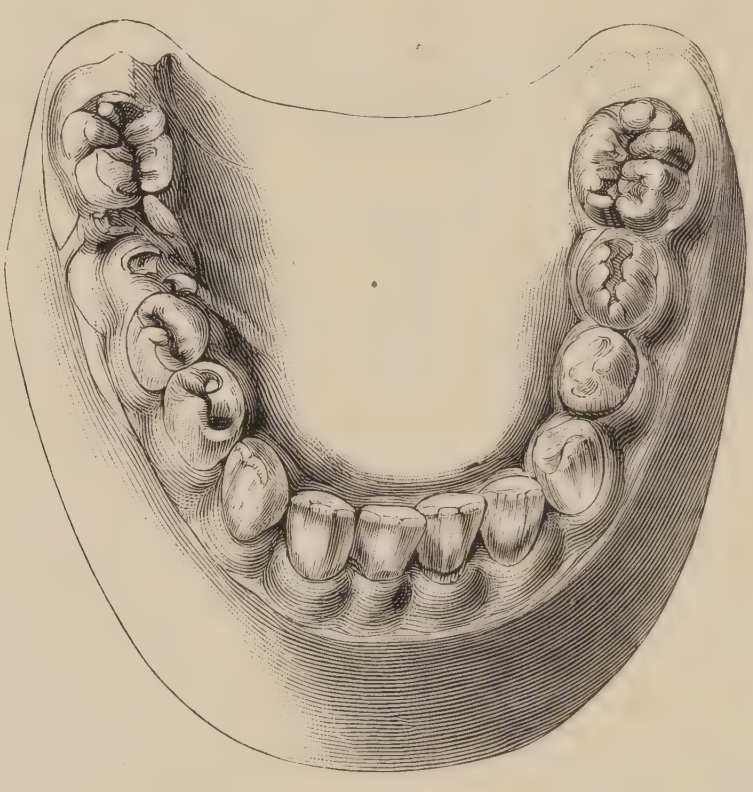

Fig. III.

Photograph of cast of lower jaw of recent English patient (my own) to show lateral compression of second bicuspids—actual size.

upper molar often observed in English patients would not have appeared in savage tribes; in this I was mistaken, as I found ten crania having extra lingual cusps on the superior molars out of the four hundred and thirty-three examined, but

this cusp was situated rather anteriorly to the position observed in English patients.

Two skulls, No. 749 B and No. 1,376, had extra roots or indications of them in five bicuspids, in each case showing a Simian approximation.

Two skulls, No. 1,301 and No. 1,245, have peculiarly formed and large second lower bicuspids, as shown by models and photographs.

In practice I have occasionally met second lower bicuspids with peculiarly flattened crowns.

Mr. Charles Tomes once asked me if I had noticed this flattening in first lower bicuspids, which has led me to hope that these notes may be either useful or interesting.

The PRESIDENT said that in listening to Mr. Balkwill's short paper, perhaps the most striking fact was that an examination of 400 crania should not have disclosed a greater number of abnormalities than Mr. Balkwill had discovered. There seemed to be only one case of caries. There were certain differences in shape, and instances of certain additional cusps on the molars. Perhaps the most interesting case was that of the wisdom teeth not through, and extraordinary development of second lower bicuspids. It was to be regretted that there were not more models, which would have aided the discussion of the paper.

Mr. F. J. BENNETT was inclined to think after having seen the model of No. 1301, that the tooth described as a badly formed molar was a retained second temporary molar, from the fact that it lay on a lower level than the other teeth, that the fangs were exposed, that it was carious, and also from the shape.

The PRESIDENT felt bound to confess that the same idea occurred to him, but the model being only a plaster cast he did not feel justified in making the same comment. He thought the point to which Mr. Balkwill desired more particularly to draw attention to in this case was the peculiar pinching of the lower bicuspids.

Mr. Sewill's paper was then read.

The Artificial Production of Dental Caries.

By Henry Sewill, M.R.C.S., L.D.S.

It was my first intention to have merely given a brief description of the experiment by which Mr. Pound and I have produced dental caries out of the mouth, but at the invitation of officers of the Society I have extended my short remarks into a more lengthy communication. This will perhaps give more opportunity for discussion. Caries, although a well-worn subject, must after all be supremely interesting to the Odontological Society; and, although there may be no room for difference of opinion on main points, there are still a considerable number of topics well worth talking about.

The members are aware that the artificial production of dental caries is not a new feat. It has been already achieved by Dr. Miller, of Berlin, and through the kindness of Dr. Miller, who lent a selection of specimens, I was able to verify the fact that the microscopical appearances were virtually identical with those of natural caries. These slides were also examined by Mr. Arthur Underwood and Mr. Pound, and this fact

was reported by me to the Society some two years ago.

After the investigations of Messrs. Milles and Underwood, of which the results were published in 1881, it became a matter of certainty that caries might be artificially produced. It had been demonstrated long before that the disintegration of enamel and dentine was mainly brought about by the action of acids, and it was also proved that the acids were in the main the products of fermentation of organic *débris* lodged upon or about the teeth. But in those days fermentation was looked upon as a purely chemical process, and the fact that proliferation of micro-organisms was essential to it was not recognised. Hence not only arose failure to produce caries by artificial means, but inability existed to interpret and fully account for several of the peculiar appearances presented by the tissues under microscopical examination. Messrs. Underwood and Milles were able to clearly show that these appearances were due to the presence and action of micro-organisms, and that the presence and the action of organisms were essential to the production and progress of caries.

Mr. Underwood commenced a series of experiments in producing caries artificially, but owing to the pressure of other work abandoned them before he had more than partially carried them

out. As the members are aware, Dr. Miller—who, following Messrs. Underwood and Milles, has done an enormous amount of work in minutely tracing out all the phenomena of caries, and in studying the morphology of the organisms concerned—fully succeeded. The success of the experiment, of course, depended upon whether conditions sufficiently like those existing within could be created out of the mouth, so that teeth submitted to the influences would undergo those destructive changes which constitute the process termed dental caries. It was next found that with the exception of leptothrix, which will not flourish away from its proper habitat, all the organisms present in caries could be cultivated either together or isolated out of the mouth. These discoveries rendered more certain the possibility of artificially producing caries.

A little over a year ago Mr. Pound and I commenced experimentation. It was found after trying various mixtures of organic substances, such as occur in the mouth, that the best for the purpose was simply bread mixed with saliva. The proportion does not matter, but one part bread to eight saliva answers well. It is not necessary to describe failures with other substances, but some which are significant may be mentioned. Meat with saliva remained alkaline, and if a small quantity of acid were added became

again rapidly alkaline. Albumen, whether as white of egg or other forms, acted in the same way. Saliva and starch produced little acid, which was soon exhausted.

About an ounce of the mixture suffices for several teeth. The teeth were immersed in the mixture in glass-stoppered bottles and kept at a temperature of about 35 to 37° C = 94 to 98° F. The bottles were unstopped about once a day for examination, and this of course admitted air. If the mixture became putrid it at once showed an alkaline reaction. The teeth were then taken out, well washed, and the mixture renewed. The mixture becomes rapidly acid and remains so (unless putrefaction to a great degree supervene) for three to five weeks. The acids present are acetic and lactic, and of the former 5 per cent., of the latter ·5 per cent., were found after three weeks. The effects upon the tissues are precisely the same, both macroscopical and microscopical, as in natural caries. Of course a tooth wholly immersed is attacked all over at once, but the disintegration advances more rapidly through mechanical or inherent flaws and fissures in the enamel. Where patches of ill-formed enamel or flaws or fissures allow rapid access of agents to dentine, the decay, as in natural caries, progresses more rapidly in that tissue than in the enamel. The enamel becomes undermined, and extensive

pigmentation or discoloration of the affected part commonly takes place. I exhibit teeth in which these effects are visible.

The incidence of the disease in natural caries is governed by the presence of inherent defects in the enamel, and by conditions of crowding and irregularity which give rise to retention of decomposing particles on some surfaces of the teeth. The object of my experiments was to produce caries as rapidly and as extensively as possible, and we did not care to imitate all these conditions. There can be no doubt, however, that if the action of agents were restricted to one spot, that spot alone would be affected; and it is sufficiently evident that minute particles of acid-forming *débris* of a character such as adhere to the teeth in the mouth would be much slower in their action than a mass of matter such as we have employed. We have, however, found that the rapidity of the disintegrating action in different teeth is governed by the structural qualities of the tissues. Ill-made enamel yields much more readily than well-formed; and globular dentine is much more rapidly invaded by organisms and destroyed than tissue of better structure. Cement resists longer than enamel, but at length gives way and allows the dentine beneath to be invaded. The experiments have been mostly made upon sound teeth; but we found that with carious teeth the decay

has continued; and if the cavity were previously excavated decay attacked first at that point and advanced most rapidly through the exposed dentine.

Pigmentation or discolouration, as already stated, is present, and it is found also that the carious dentine readily takes up stains introduced such as are often admitted to the mouth in medicines or articles of food. Staining in natural caries is no doubt often due to this cause. The phenomena attending the invasion of organisms and their proliferation along the tubes differ in no respect from natural caries. The "zone" is present, also "pipe-stem" appearance. Another appearance—which also occurs in natural caries—to which my attention was first directed by Mr. Mummery, but which is described and figured by Dr. Miller, is discoverable. This is an appearance which at first sight looks like "pipe-stem" dentine in vertical section, but on close examination proves to be a distinct phenomenon. The sections do not take stain as do the "pipe stems." The tubes seem dilated and filled with highly refractive bodies. These bodies are cylindrical in shape, and they split up into fragments of varying length. It is possible, sometimes, by squeezing a section, to force these bodies from the orifices of tubes. Transverse sections of this altered dentine are also to be

obtained. They resemble "pipe stem" dentine, but the outlines are smaller in circumference and the refractive bodies occupy the tubes.

The organisms are best displayed after staining with aniline violet. The colour can be washed out of the tissue by spirit after being fixed in the organisms by treatment with iodine—potassic iodide solution. To show tissue changes the sections can be then stained with orange rubin. This differentiates the altered tissue beautifully. Unaffected dentine shows deep red, the "zone" faint pink, "pipe-stems" red with lighter centre, and dentine in last stage of softening light yellow. I think it will be admitted no more exquisite preparations have ever been seen than those cut and stained by Mr. Pound, some of which are exhibited this evening; and I wish once more to express the deep obligation I am under to Mr. Pound, without whose aid I would never have undertaken the task of examining the pathology of caries.

The artificial production of caries may be perhaps considered a crucial experiment, by which the last shreds of doubt as to the essential character of the disease must be destroyed. Within late years controversy on this subject has died down, and I doubt if it will be ever revived. At any rate if it be, I shall take no part in it.

I have said my last word on the subject, for I feel that few facts in the range of science are more conclusively demonstrable than those concerning the causation and nature of dental caries.

I believe there are still some individuals among civilised and enlightened peoples who hold that the earth is flat, or that the sun revolves around it. I don't know whether anyone finds it worth while to controvert such views; at least a discussion of them could not be considered very practical. It is not likely that the laws of navigation will be modified in accordance with such ideas. Similarly, it is not at all probable that the well-known rules of hygiene for prevention of dental caries, or its treatment as now universally practised, will be altered because some individuals refuse to accept the verdict of science—a verdict based upon an overwhelming mass of incontrovertible evidence, derived from easily verifiable observation, and supported throughout by easily confirmable experiment.

It is now much more than a quarter of a century since Sir J. Tomes laid it down as his opinion that "caries is an effect of external causes, in which so-called 'vital' forces play no part; that it is to a great extent due to the solvent action of acids which have been generated by fermentation going on in the mouth; and when once the disintegrating process is established at some con-

genitally defective point, the accumulation of food and secretions in the cavity intensifies the mischief by furnishing fresh supplies of acid;" and further, he pointed out that "inasmuch as no characteristic appearances can be found to distinguish caries occurring in living from those in dead teeth refixed in the mouth as artificial substitutes, the hypothesis of vital action in any way modifying the disease must be abandoned *in toto*, and dental caries cannot, strictly speaking, be said to have any 'pathology.'"

This definition of caries is in its essence not less exact now than when first penned; the knowledge of bacteriology since acquired has merely confirmed and established its truth.

I may conclude by summarising the main facts upon which determination of the nature of caries is based.

First, the anatomical characters of the teeth, and the physiological qualities of enamel and dentine, render it in the highest degree improbable (I believe it impossible) that these tissues could be the seat of true pathological action.

Second, no morbid conditions of enamel or dentine (of course excluding innate defects) are ever discoverable save such as are due to external causes.

Third, dentine and enamel (if it have any) derive their vitality from the pulp; but caries in

pulpless teeth is identical with the disease in teeth with living pulps.

Fourth, the presence of the destructive agents —acids and organisms—is in every instance verifiable, and their action upon the tissues can be readily discerned and followed.

Fifth, congestion and inflammatory phenomena in contiguous vascular connections—indispensable factors in active disease of avascular tissues—are not necessary accompaniments of dental caries.

Sixth, the predisposing causes of caries, the laws which govern the point of attack, its rate of progress and the macroscopical and microscopical appearances in the tissues, are each and all identical as observed in dead teeth worn as artificial substitutes and living teeth.

Lastly, decay identical in every respect with caries can be produced artificially in extracted teeth out of the mouth.

Discussion.

The President said that a letter had been received from Mr. Sewill stating that his voice was so weak that any attempt to take part in the discussion would be harmful to him. It would be generally regretted that Mr. Sewill was not able to be present. With regard to the paper and the discussion of it, the President felt that their chief difficulty was in connection with the specimens by which it was illustrated. He ought perhaps to explain why there were no photographs or drawings of them. The reason was that the specimens were under a high power, the objectives being mostly $\frac{1}{12}$ in. It would be necessary, therefore, that they should examine the actual specimens, and he thought it was more satisfactory upon the whole. Probably the meeting would be more productive of interest if they proceeded at once to discuss what had been read, and spend the remainder of the time examining the specimens.

Mr. Howard Mummery said Mr. Sewill had kindly sent him a number of the specimens prepared by Mr. Pound. He had had an opportunity of carefully examining them, and, like all Mr. Pound's specimens, they were most beautifully cut and stained. Having also had opportunities of examining many specimens of artificial caries prepared by Dr. Miller, he had been able to compare these with them. Dr. Miller's specimens showed all the points shown in the slides now exhibited, but the Gram method employed by Mr. Pound was perhaps better adapted for clearly demonstrating the individual micro-organisms than the simple staining usually employed. In his recent experiments Dr. Miller had added *meat* to the bread and saliva, and changed the mixture every three days. With regard to Messrs. Milles and Underwood's experiments, if Mr. Underwood had been

present Mr. Mummery thought he would be the first to acknowledge that in their experiments on the artificial production of caries sufficient attention had not been paid to the reaction of the solution—the alkaline putrefactive processes set up in the mixture neutralizing the acid produced by the caries bacteria. Mr. Sewill said, "with the exception of leptothrix. . . . all the organisms present in caries could be cultivated out of the mouth, either together or isolated." This, Mr. Mummery thought, was very much open to doubt, in fact Dr. Miller distinctly stated that there were organisms present in caries which could not be grown out of the mouth, and he had noticed one point of difference between artificial and natural caries, namely, that the organisms in artificial caries did not give the violet reaction with iodine. He had noticed this some time ago, but accidentally omitted to mention it in his book. The reason he believed to lie in the fact that the organisms giving this reaction could not be cultivated out of the mouth. The pipe-stem appearances in caries, to which he had drawn Mr. Sewill's attention, were those seen in vertical section, and he had never seen them take any stain. He did not think that the so-called pipe-stem appearances, seen in transverse section, in which stained masses of various diameters were visible, were due to the same cause as these appearances in vertical section.

Mr. Charters White said that it was a subject into which he had not gone very much. In conversation during the reading of the paper he had remarked that probably the acid action of the chemical employed might prevent the pipe-stem from taking the stain very deeply. In his experience it was a very difficult thing to stain an acid preparation.

The President said that as Mr. Pound was present, he thought it would add very much to the interest of Mr. Sewill's paper if they could hear him on the subject.

Mr. Pound said the majority of bacteria grew best when they had free access to oxygen, while others would only grow when all oxygen was excluded. The former were called aërobic, the latter anaërobic, but there were other forms which grew either with or without oxygen. These were

termed facultative anaërobic. The methods for studying these anaërobic organisms were very complicated, consequently this branch of bacteriology was very much neglected. No doubt a number of such organisms existed in the human mouth under special conditions, for he (Mr. Pound) had noticed that when persons slept with their mouth shut certain varieties of bacteria seemed to predominate, and there was also an increased acid reaction, whereas in persons who slept with their mouth open the bacteria were of various kinds and the acid not so marked. As an example of a facultative anaërobic organism, Esmarch Spirillum Rubrum was perhaps the most conspicuous. This organism grew very slowly, forming a faint cream-coloured growth on the surface of the nutrient media, while if grown without oxygen in the depth of the gelatine it assumed a blood-red colour and grew more rapidly. He might say that he had never attempted to isolate the various organisms in the mouth, and produced caries artificially by any specific acid-forming organisms. Speaking of the morphology of bacteria only, in artificial cases there were a number of organisms resembling leptothrix in natural caries under a magnification of 300 diameter, but under a higher power by careful illumination and focussing the condensers proved them to be quite different. They were much shorter and appeared distinctly beaded. Their method of penetrating the tissue was also different, but after all these might be only phase forms in their life history. With regard to this peculiar pipe-stem appearance, it was entirely different from that mentioned by Tomes. With dark ground illumination they could be seen as standing out quite sharp and highly refractive. They could not be stained, whereas the true pipe-stems took the orange-rubin stain quite readily. They were to be found in natural and artificial caries. By transmitted light in vertical section they resembled the Anthrax Bacillus, showing the square cut ends and divisions or segments. In some of these rods there were several small still more highly refractive granules varying very much in size. Prof. Miller described these bodies, but did not state the nature of them.

With regard to the acid in the mixture used for producing caries artificially, Mr. Pound did not test it himself. Mr. Broughton analysed the mixture and found about 5 per cent. acetic acid and ·5 per cent. lactic acid.

Mr. Storer Bennett desired to add a tribute of praise to the beautiful specimens cut and stained by Mr. Pound, and to thank Mr. Sewill for having brought them to the notice of the Society. It was interesting to see that his (Mr. Sewill's) conclusions were identical with those propounded by Dr. Miller in his German work, published in the spring of 1890. It was a matter of common knowledge that the bulk of Prof. Miller's observations were published in separate papers in the *Dental Cosmos* and *Independent Practitioner* a good deal earlier than the German work itself appeared, and it would be noticed that nearly all the observations Dr. Miller had made had been borne out by Mr. Sewill subsequently. The reason Messrs. Milles and Underwood were not successful was, as Dr. Miller stated, that fermentation was not allowed to continue in consequence of the solutions putrefying, and the putrefaction resulted in an alkaline solution instead of in an acid one. Mr. Storer Bennett thought that it was due to Prof. Miller, whose work on this subject had been going on for the past nine years, that the fact should be put on record, as Mr. Sewill would himself be the first to admit, that Mr. Sewill's work was merely a verification of Dr. Miller's placed before the profession years ago.

Mr. F. J. Bennett wished to say that twenty years ago they were on the eve of a discovery such as Dr. Miller had made. Coleman and Cartwright were experimenting with saliva and bread, but they did not notice that the solution became alkaline. Nevertheless, they were on the right tack.

Mr. G. Cunningham thought that anybody acquainted with the bacteriological action of caries would have anticipated that the discussion on Mr. Sewill's paper would not lead to anything new. With regard to some remarks which had fallen from Mr. Pound, he thought he (Mr. Pound) was inclined to exaggerate the fact that certain micro-organisms were easily cultivatable out of the mouth, and when this

could not be done they were probably of an anaërobic nature. As an example he might cite one case. He referred to a brick-red growth not infrequently seen on the labial surfaces of the teeth of children and young adults. Cover-glass preparations of this growth seem to indicate that it was almost if not quite a pure culture. The bacterium was evidently aërobic, and yet all attempts to cultivate it out of the mouth had failed, the reason being that the proper culture medium had not yet been discovered. This was true also of other mouth bacteria, and therefore he thought that part of Mr. Sewill's paper was not justified. Another point upon which he wished to touch was Mr. Sewill's statement as to the presence of acetic acid 5 per cent., and lactic acid 0·5 per cent., if he remembered rightly. It would have been extremely interesting to have heard what methods were employed in this quantitative analysis. It was a well-known fact that the quantitative determination of lactic acid was a somewhat difficult matter, and this, with other items of chemical research, formed not the least important part of Professor Miller's investigations. Indeed, it was greatly owing to Professor Miller's training in other departments of science, previous to his entering upon the study of dentistry, that his original investigations were so reliable. Mr. Cunningham thought the term "pipe-stem appearance," as applied to the rod-shaped formations in carious dentine, somewhat confusing. The "tobacco-pipe stem" appearance as described by Tomes, was apparent in any *transverse* section of tubules of carious dentine. A *longitudinal* section of the same carious dentine presented no resemblance to tobacco pipe-stems. The further extension of the term, even with the prefix "broken" is therefore confusing when applied to the not rare but still relatively much less frequent appearance of rod-shaped formations seen in longitudinal sections of the tubules of carious dentine.

The PRESIDENT, in closing the discussion, said that the remarks had certainly been carefully limited to the title of the paper, a course which he thought had been fully justified. The opportunity to discuss vital action had not been accepted.

Votes of Thanks.

Votes of thanks and announcements for next meeting concluded the business.

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